

K4
11/2: C719
c. 2



*North Carolina Department of Transportation
Statewide Planning Branch
Systems Planning Unit*

Thoroughfare Plan *for the towns of* *Columbus and Tryon*



JANUARY 1996



**THOROUGHFARE PLAN
FOR THE
TOWNS
OF
COLUMBUS AND TRYON**

Prepared by the:

Statewide Planning Branch
Division of Highways
N. C. Department of Transportation

In Cooperation with:

The Town of Columbus
The Town of Tryon
Polk County
The Federal Highway Administration
U. S. Department of Transportation



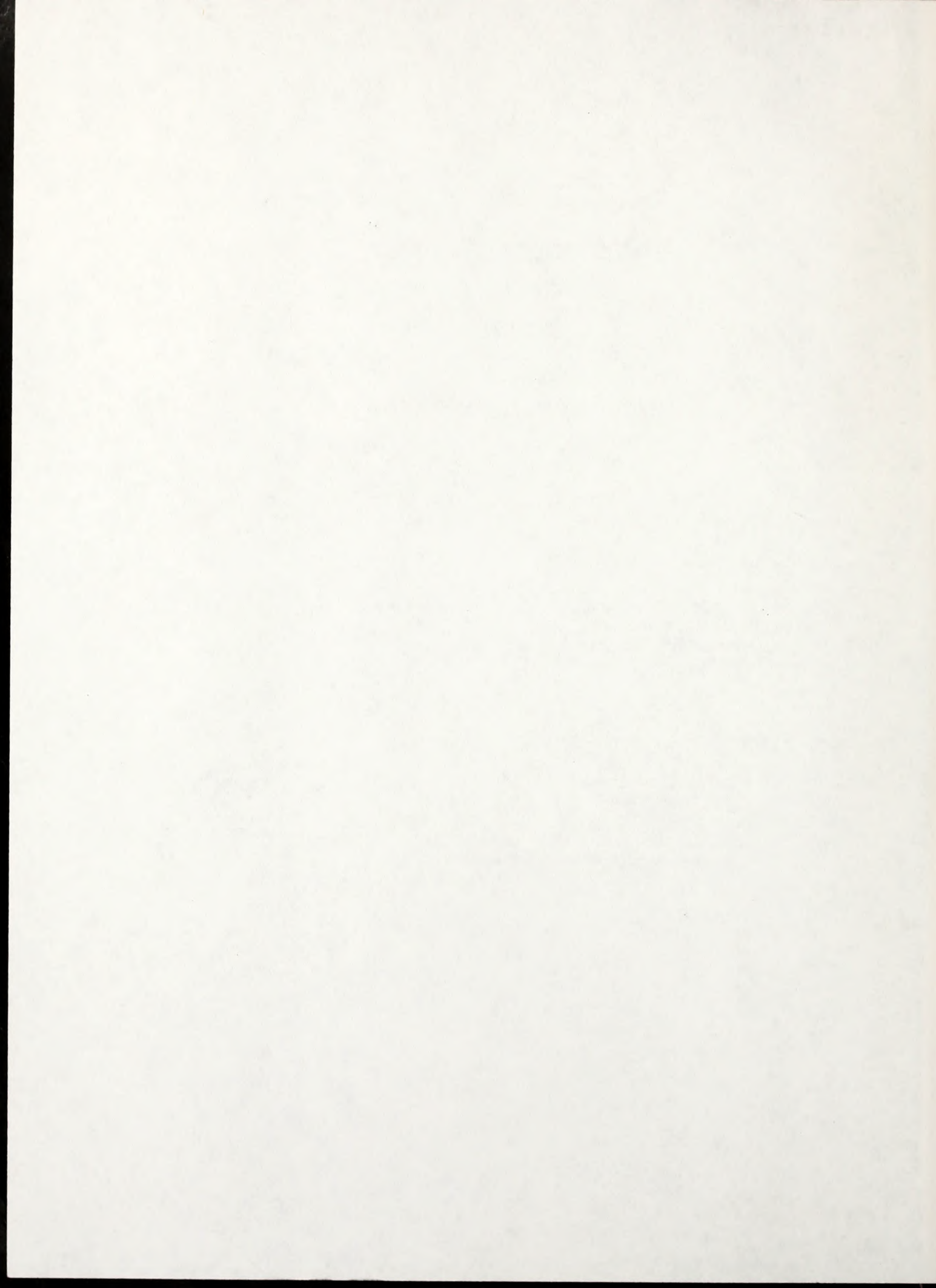
Arnold Blake Norwood Jr.

January, 1996

N.C. DOCUMENTS
CLEARINGHOUSE

MAR 28 1996

N.C. STATE LIBRARY
RALEIGH



Acknowledgements

Persons Responsible For This Report:

Project Engineer:	Anna E. Hayes Brigman
Systems Planning Engineer:	Mike Tewell
Group Manager:	A. Blake Norwood, P.E.
Manager Statewide Planning Branch:	M. R. Poole, Ph.D., P.E.
Project Technician:	Jocelyn Jones

Recommendations

Recommendations for the future

Project completion
System planning
Data management
Project completion
System planning
Data management
Project completion
System planning
Data management

Executive Summary

In March of 1991, the Towns of Columbus and Tryon requested thoroughfare planning assistance from the Statewide Planning Branch of the North Carolina Department of Transportation. The resulting Columbus and Tryon Thoroughfare Plan (refer to Figure 2, page 11) was developed using the thoroughfare planning principles described in Chapter VI of this report. It is based on current traffic, population, and land use trends; environmental impacts; and local input. Traffic projections for the year 2020 were used to determine capacity deficiencies on area roads.

This report documents the findings of the study and the resulting recommendations (refer to Figure 4, page 19). It includes recommendations for thoroughfare cross-sections, cost estimates and benefit evaluations for the recommended improvements, and recommendations for plan implementation.

Following several informational meetings with the Town Managers and the County Manager, public hearings were held in both Columbus and Tryon. The recommended widening of NC 108 and US 176 (refer to Figure 4, page 19) was a point of contention at both the July 17, 1995, public hearing in Columbus and the August 28, 1995, public hearing in Tryon. Concern about the recommendation to change Pacolet Street and Walnut Street to one-way facilities was also expressed at the Tryon hearing. At the end of the August 28, 1995, hearing, the plan was adopted by the Tryon Council with an amendment to remove the one-way recommendations and an inclusion in the report stating that the local municipality was not interested in the widening of US 176. **At the time this report was published, Polk County and the Town of Columbus had not yet adopted the Columbus and Tryon Thoroughfare Plan.**

Initiative for plan implementation will rest largely with the policy boards and citizens of the area. Highway needs throughout the State exceed the available funding. Therefore, local areas should aggressively pursue funding for desired projects.

It should be emphasized that the recommended plan is based on anticipated growth and development of the planning area as indicated by current trends and land use. Prior to construction of specific projects, a more detailed study will be required to reconsider development trends and to determine specific design requirements.

Executive Summary

In March of 1999, the Board of Directors and the Executive Management Committee of the company met to discuss the results of the 1998 audit and the company's performance. The Board of Directors and the Executive Management Committee are pleased with the results of the 1998 audit and the company's performance. The Board of Directors and the Executive Management Committee are pleased with the results of the 1998 audit and the company's performance.

This report contains the findings of the audit and the results of the company's performance. The Board of Directors and the Executive Management Committee are pleased with the results of the 1998 audit and the company's performance. The Board of Directors and the Executive Management Committee are pleased with the results of the 1998 audit and the company's performance.

The following report contains the findings of the audit and the results of the company's performance. The Board of Directors and the Executive Management Committee are pleased with the results of the 1998 audit and the company's performance. The Board of Directors and the Executive Management Committee are pleased with the results of the 1998 audit and the company's performance.

This report contains the findings of the audit and the results of the company's performance. The Board of Directors and the Executive Management Committee are pleased with the results of the 1998 audit and the company's performance. The Board of Directors and the Executive Management Committee are pleased with the results of the 1998 audit and the company's performance.

It should be noted that the information in this report is based on the information provided by the company and is not intended to be a substitute for the company's financial statements. The Board of Directors and the Executive Management Committee are pleased with the results of the 1998 audit and the company's performance. The Board of Directors and the Executive Management Committee are pleased with the results of the 1998 audit and the company's performance.

Table of Contents

	Page
I. Introduction	1
II. Thoroughfare Plan	5
Major Thoroughfare System	5
Minor Thoroughfares System	8
Construction Priorities	15
III. Implementation	21
State and Municipal Adoption of the Thoroughfare Plan	21
Subdivision Control	22
Zoning	22
Future Street Lines	22
Capital Improvements Program	23
Official Maps	23
Urban Renewal	24
Development Reviews	25
Other Funding Sources	25
IV. Thoroughfare Planning Principles	27
Objectives	27
Operational Efficiency	28
System Efficiency	30
Application of Thoroughfare Planning Principles	32
V. Existing and Projected Conditions	35
Land Use	35
Population Trends	37
Economy and Employment	38
Major Routes	43
Travel Demand	43
Traffic Accidents	47
VI. Environmental Concerns	53
Wetlands	53
Historical Sites	53
Threatened and Endangered Species	54
Air and Noise Pollution	55
Appendix A: Public Comment	A-1
Appendix B: Thoroughfare Plan Street Tabulation and Recommendations	B-1
Appendix C: Typical Cross-Sections	C-1
Appendix D: Recommended Subdivision Ordinances	D-1

GEOGRAPHIC LOCATION FOR COLUMBUS AND TRYON NORTH CAROLINA

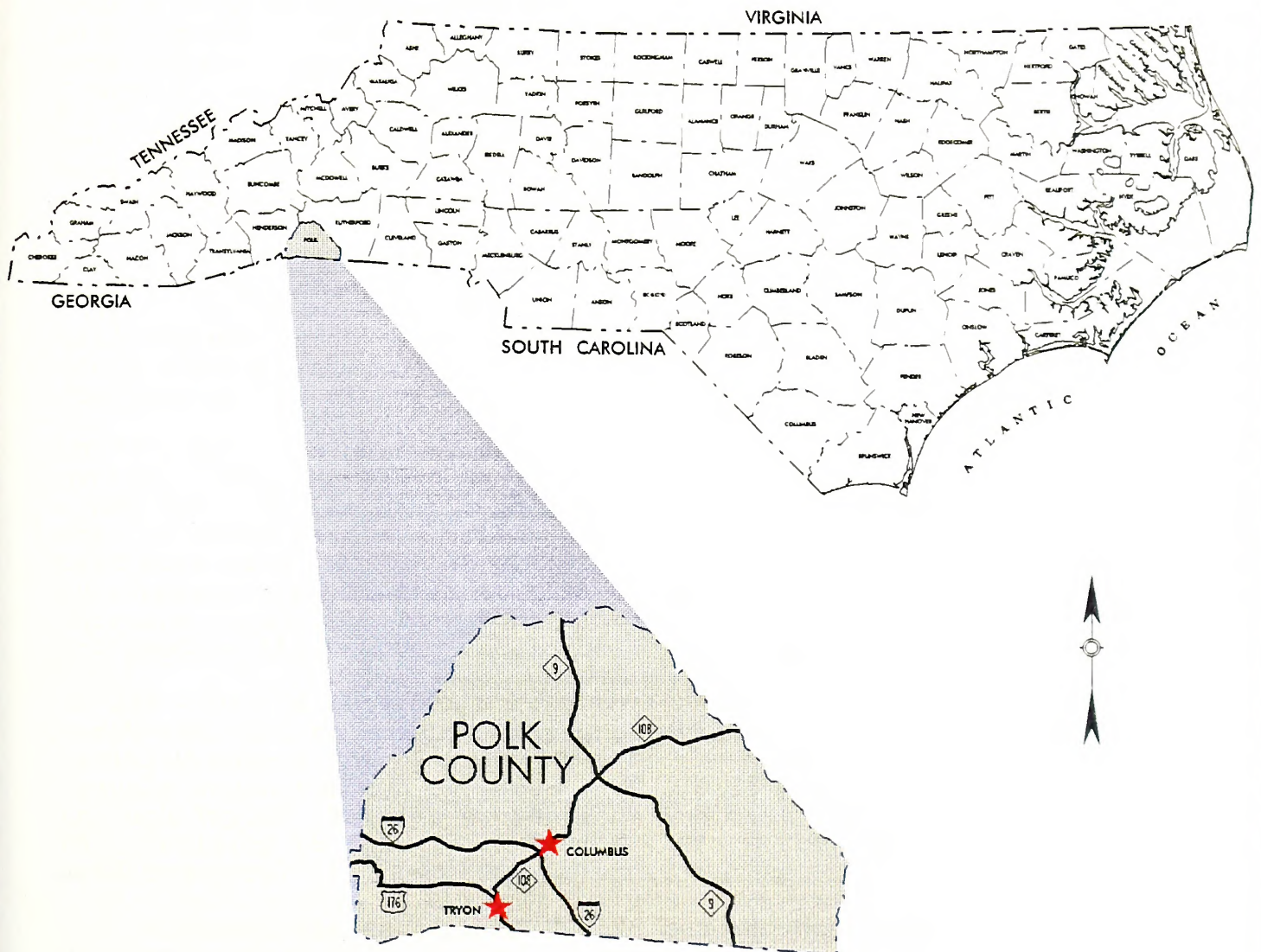


FIGURE 1

GEOGRAPHIC LOCATION
FOR
COLUMBUS AND TRIVIA
NORTH CAROLINA



FIGURE 1

II. Thoroughfare Plan

On March 6, 1991, the Towns of Columbus and Tryon requested thoroughfare planning assistance from the Statewide Planning Branch. The resulting Columbus and Tryon Thoroughfare Plan is shown in Figure 2. A functional description of each major thoroughfare, minor thoroughfare, and recommended improvement is given below. More detailed descriptions of each thoroughfare and improvement are given in Appendices B and C.

Major Thoroughfare System

I-26 - I-26 is an east-west facility bisecting the Columbus-Tryon planning area. Although it primarily carries through-traffic, it does have interchanges at both NC 108 and US 74. However, traffic traveling from I-26 West to US 74 East and traffic traveling from US 74 West to I-26 East must cross NC 108 at grade. Now that the extension of US 74 is complete, the traffic at this interchange is expected to increase steadily. Therefore, long range improvements to accommodate these moves should be considered (see Figure 3).

At the County's request, a truck pull off should be constructed at the top of the mountain in the vicinity of Mile Post 31 along I-26 East and Mile Post 32 along I-26 West. This will improve safety along the facility. Trucks traveling this route need a place to cool their brakes before traveling down the inclines in the vicinity of these mile posts.

US 74 - US 74 is part of the North Carolina Intrastate Highway System. This east-west facility extends from the North Carolina coast to I-26. As mentioned above, traffic traveling from I-26 West to US 74 East and traffic traveling from US 74 West to I-26 East must cross NC 108 at grade. Now that the extension of US 74 is complete, the traffic at this interchange is expected to increase steadily. Therefore, long range improvements to accommodate these moves should be considered (see Figure 3).

US 176 - US 176 provides access to Asheville via US 25 to the north-west and to Spartanburg, SC to the south-west. This facility enters the planning area to the north of Tryon and travels south through the area. US 176 is primarily commercial through Tryon. Traffic projections indicate the need to widen this facility to four lanes from NC 108 to the southern planning area boundary.

Although the section of US 176 between West Howard Street and New Market Road will be over capacity by the year 2020, the geometrics of the downtown area will not accommodate widening the existing road to four twelve-foot lanes. One option that was considered was eliminating on-street parking. However, this would at best allow for four ten-foot lanes and would leave the downtown

area with no parking. Therefore, this option was eliminated from consideration.

The second alternative considered was a bypass. However, a bypass will not reduce the design year traffic projections sufficiently along the existing route. The majority of through-traffic travels south along I-26; not along US 176. The traffic traveling US 176 is mostly local. Thus, this alternative was also eliminated from consideration.

The third option considered was the creation of a one-way pair. Two existing roads were considered for this alternative - Depot Street and Palmer Street. Using US 176 and Depot Street would create a one-way pair divided by a railroad track, which could cause both safety and congestion problems. Creating a one-way pair with US 176 and Palmer Street would disrupt too many businesses in the area. Therefore, the creation of a one-way pair is not a feasible alternative.

The only remaining alternative for the section of US 176 between West Howard Street and New Market Road is the "no-build" alternative.

Note: Although traffic projections indicate the need to widen US 176 from NC 108 to the southern planning area boundary, the local municipalities are against widening to four lanes.

NC 108 - NC 108 begins at US 176 in Tryon, bisects Columbus, and connects to US 64, US 74, and US 221 around Spindale. This facility serves both commercial and industrial traffic in the Columbus-Tryon planning area. Traffic projections indicate the need to widen this facility to four lanes from US 176 to the northern planning area boundary with turning lanes at I-26, each industrial entrance, the hospital entrance, and the high school entrance. The majority of traffic is either local or is traveling to and from commercial or industrial areas along NC 108. Thus, constructing a bypass would not sufficiently decrease traffic in the area. **Although traffic projections indicate that NC 108 will be well over capacity by the design year, the local municipalities are against widening to four lanes.** The Towns of Columbus and Tryon have requested that only turning lanes be recommended at I-26, each industrial entrance, the hospital entrance, and the high school entrance. It is also recommended that a traffic signal be added at the NC 108 and I-26 interchange. This will increase safety at the interchange.

Carolina Drive (SR 1116) - Carolina Drive provides access US 176 to Hogback Mountain. This radial facility also serves residential traffic in the Tryon area. The two-lane facility should be adequate for traffic throughout the planning period.

Edwards Road (SR 1137)/Houston Road - These facilities combine to serve as a radial in the Columbus area. They access NC 108 at two points: Edwards Road provides access several miles north of the

planning area and Houston Road provides access in Columbus' City Limits. This radial facility also provides access to Polk County High School. These two-lane facilities should be adequate for traffic throughout the planning period.

Fox Mountain Road (SR 1531) - Fox Mountain Road carries traffic from outlying areas into the planning area. It provides direct access from outside the planning area to NC 108 just north of Columbus' City Limits. This two-lane facility should be adequate for traffic throughout the planning period.

Harmon Field Road (SR 1121) - Harmon Field Road connects US 176 and NC 108 just north of Tryon. This two-lane facility should be adequate for traffic throughout the planning period.

Hogback Mountain Road (SR 1115)/Embury Street/Laurel Avenue - These facilities serve as a radial in the Tryon area and provide access to Hogback Mountain. The two-lane roads should be adequate for traffic throughout the planning period.

Melrose Avenue/Pacolet Street/Walnut Street and Melrose Avenue/Chestnut Street - The Melrose Avenue/Walnut Street/Pacolet Street thoroughfare and the Melrose Avenue/Chestnut Street thoroughfare currently connect the Hogback Mountain Road/Embury Street/Laurel Avenue radial to US 176. These facilities are largely commercial. They should be adequate for traffic throughout the planning period.

New Market Road (SR 1502) - New Market Road serves as a radial in the Tryon area. Although it is largely residential, it becomes commercial as it approaches US 176. This two-lane facility should be adequate for traffic throughout the planning period. However, the intersection with US 176 should be realigned. In order not to create an additional railroad crossing, New Market Road, McCown Street, and US 176 should be realigned to form a standard "T-intersection" at the crossing of US 176.

Old US 19 (SR 1514)/Hooker Road (SR 1515) - Old US 19 and Hooker Road serve as a radial carrying traffic from outlying areas into the planning area. They provide direct access to NC 108 just south of Columbus' City Limits. These two-lane facilities should be adequate for traffic throughout the planning period.

Old Howard Gap Road (SR 1122) - Old Howard Gap Road serves as a radial carrying traffic from outlying areas into the planning area. It provides direct access to NC 108 just north of Tryon's City Limits. This two-lane facility should be adequate for traffic throughout the planning period.

Peak Street/Sandy Road (SR 1534)/Hayes Road (SR 1534) - Peak Street, Sandy Road, and Hayes Road serve as a radial carrying traffic from outlying areas into the planning area. This radial provides direct access to NC 108 inside the city limits of Columbus and provides access to Williams Mountain. These two-lane

facilities should be adequate for traffic throughout the planning period.

Walker Street/Peniel Street (SR 1137)/Houston Road (SR 1137) - Walker Street, Peniel Street, and Houston Road serve as a radial carrying traffic from outlying areas into the planning area. This radial provides direct access to NC 108 within the city limits of Columbus and provides access to Williams Mountain. These two-lane facilities should be adequate for traffic throughout the planning period.

Minor Thoroughfare System

Capps Road (SR 1543) - Capps Road connects two major thoroughfares between the Tryon City Limits and the Columbus City Limits - NC 108 and Hooker Road. This facility also provides access to another minor thoroughfare, Gunning Road. Capps Road primarily collects residential traffic and funnels it to NC 108, Hooker Road, and Gunning Road. This two-lane road should be adequate for traffic throughout the planning period.

Chestnut Street - Chestnut Street connects two major thoroughfares inside Tryon's City Limits - Melrose Avenue and NC 108. It serves both commercial and residential traffic. This two-lane facility should be adequate for traffic throughout the planning period.

Constance Street - Constance Street connects a major thoroughfare and a minor thoroughfare inside Columbus City Limits - Peak Street and Walker Street, respectively. It primarily serves residential traffic. This two-lane facility should be adequate for traffic throughout the planning period.

East Howard Street/Vaughn Street - East Howard Street and Vaughn Street provides access to two major thoroughfares and a minor thoroughfare in Tryon City Limits - NC 108, New Market Road, and Peake Street, respectively. These residential streets should be adequate for traffic throughout the planning period.

Lockhart Road/Embury Street - Lockhart Road and Embury Street connect a major thoroughfare and a minor thoroughfare in Tryon City Limits - Hogback Mountain Road and West Howard Street, respectively. These residential streets will be adequate to handle the projected 2020 traffic volumes.

Marham Road/Shepherd Street/Peake Street - Marham Road, Shepherd Street, and Peake Street connect two minor thoroughfares inside Tryon's City Limits - Scriven Road and East Howard Street. These residential streets should be adequate to handle design year traffic.

Melrose Avenue/Braewick Road - Melrose Avenue and Braewick Road connect two major thoroughfares in Tryon's City Limits - Laurel Avenue and Carolina Drive. They primarily collect residential

traffic. These two-lane facilities should be adequate for traffic throughout the planning period.

Old US 19 (SR 1514) - Old US 19 connects two major thoroughfares in and just south of Columbus' City Limits - NC 108 and Old US 19/ Hooker Road. This two-lane facility primarily collects residential traffic. Old US 19 will be adequate to handle the projected 2020 traffic volumes.

Park Street - Park Street connects two major thoroughfares within Columbus' City Limits - NC 108 and Hayes Road. It primarily collects residential traffic. This two-lane facility should be adequate for traffic throughout the planning period.

School Street/West Howard Street - School Street and West Howard Street form a loop with each connected to US 176 inside the city limits of Tryon. They also provide access to the minor thoroughfare formed by Lockhart Road and Embury Street. School Street and West Howard Street serve both school and emergency vehicle traffic. To allow for the safe and efficient movement of emergency vehicles from the fire station, a left turn lane should be added on West Howard Street from the fire station to US 176.

Scriven Road (SR 1506)/Gunning Road (SR 1511) - Scriven Road and Gunning Road connect two minor thoroughfares north of Tryon City Limits - Marham Road and Capps Road. They primarily serve residential traffic. These two-lane facilities should be adequate for traffic throughout the planning period.

Simms Street - Simms Street connects two major thoroughfares in Columbus' City Limits - Walker Street and Peak Street. This two-lane facility should be adequate for traffic throughout the planning period.

Skyuka Road (SR 1135) - Skyuka Road connects two major thoroughfares - Houston Road west of Columbus' City Limits and NC 108 south of Columbus' City Limits. It primarily serves residential traffic. This two-lane facility should be adequate for traffic throughout the planning period.

Walker Road (SR 1533) - Walker Road connects two major thoroughfares east of Columbus' City Limits - Fox Mountain Road and Hayes Road. It primarily serves residential traffic. This two-lane facility should be adequate for traffic throughout the planning period.

Walker Street - Walker Street connects a major thoroughfare and a minor thoroughfare within Columbus' City Limits - Peniel Street and Constance Street, respectively. It primarily serves residential traffic. This two-lane facility should be adequate for traffic throughout the planning period.

to which, when the time comes, the Government will be able to
throughout the country.

On 10th July 1944, the Government announced that it was
in the process of setting up a new Ministry of Health, to
replace the Ministry of Health, which had been abolished
in 1941. The new Ministry of Health was to be headed by
Mr. J. A. G. Rees, who had been Minister of Health
from 1941 to 1944. The new Ministry of Health was to
be responsible for the administration of the health
services of the country, and for the control of the
supply of medical supplies and equipment.

The new Ministry of Health was to be a department of
the Government, and was to be responsible for the
administration of the health services of the country.
It was to be responsible for the control of the
supply of medical supplies and equipment, and for the
control of the prices of these supplies and equipment.
It was to be responsible for the control of the
supply of medical services, and for the control of the
prices of these services.

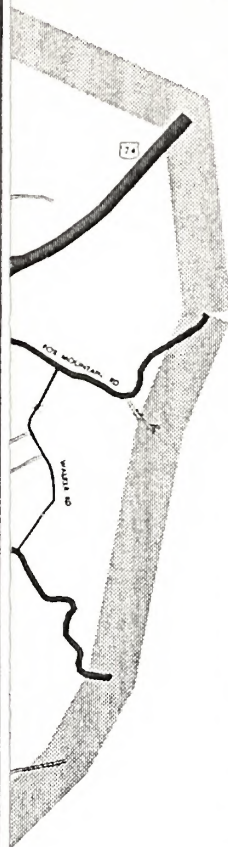
The new Ministry of Health was to be a department of
the Government, and was to be responsible for the
administration of the health services of the country.
It was to be responsible for the control of the
supply of medical supplies and equipment, and for the
control of the prices of these supplies and equipment.
It was to be responsible for the control of the
supply of medical services, and for the control of the
prices of these services.

The new Ministry of Health was to be a department of
the Government, and was to be responsible for the
administration of the health services of the country.
It was to be responsible for the control of the
supply of medical supplies and equipment, and for the
control of the prices of these supplies and equipment.
It was to be responsible for the control of the
supply of medical services, and for the control of the
prices of these services.

The new Ministry of Health was to be a department of
the Government, and was to be responsible for the
administration of the health services of the country.
It was to be responsible for the control of the
supply of medical supplies and equipment, and for the
control of the prices of these supplies and equipment.
It was to be responsible for the control of the
supply of medical services, and for the control of the
prices of these services.

The new Ministry of Health was to be a department of
the Government, and was to be responsible for the
administration of the health services of the country.
It was to be responsible for the control of the
supply of medical supplies and equipment, and for the
control of the prices of these supplies and equipment.
It was to be responsible for the control of the
supply of medical services, and for the control of the
prices of these services.

The new Ministry of Health was to be a department of
the Government, and was to be responsible for the
administration of the health services of the country.
It was to be responsible for the control of the
supply of medical supplies and equipment, and for the
control of the prices of these supplies and equipment.
It was to be responsible for the control of the
supply of medical services, and for the control of the
prices of these services.



LEGEND

	PLANNING AREA BOUNDARY	
	EXISTING	PROPOSED
MAJOR THOROUGHFARE		
FREEWAY		
OTHER		
MINOR THOROUGHFARE		

ADOPTED BY:

TOWN OF COLUMBUS	10-5-95
TOWN OF TRYON	8-28-95
POLK COUNTY	11-20-95
PUBLIC HEARINGS	7-17-95
	8-28-95
RECOMMENDED BY	
STATEWIDE PLANNING	12-13-95
N.C. DEPARTMENT OF	
TRANSPORTATION	1-5-96

THOROUGHFARE PLAN FOR COLUMBUS AND TRYON

POLK COUNTY
NORTH CAROLINA

PREPARED BY

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
STATEWIDE PLANNING BRANCH - GIS BRANCH

IN COOPERATION WITH THE

U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION

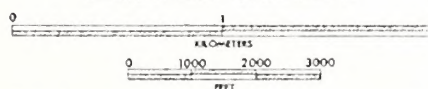


FIGURE 2

1. The first of these is the fact that the number of cases of the disease is increasing.

2. The second is the fact that the number of cases of the disease is increasing.

3. The third is the fact that the number of cases of the disease is increasing.

4. The fourth is the fact that the number of cases of the disease is increasing.

5. The fifth is the fact that the number of cases of the disease is increasing.

6. The sixth is the fact that the number of cases of the disease is increasing.

7. The seventh is the fact that the number of cases of the disease is increasing.

8. The eighth is the fact that the number of cases of the disease is increasing.



LEGEND

PLANNING AREA BOUNDARY



EXISTING

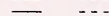
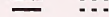
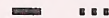
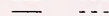
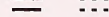
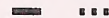
PROPOSED

MAJOR THOROUGHFARE

FREEWAY

OTHER

MINOR THOROUGHFARE



ADOPTED BY:

TOWN OF COLUMBUS
TOWN OF TRYON
POLK COUNTY
PUBLIC HEARINGS

10-5-95
8-28-95
11-20-95
7-17-95
8-28-95

RECOMMENDED BY
STATEWIDE PLANNING
N.C. DEPARTMENT OF
TRANSPORTATION

12-13-95
1-5-96

THOROUGHFARE PLAN FOR COLUMBUS AND TRYON

POLK COUNTY
NORTH CAROLINA

PREPARED BY:

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
STATEWIDE PLANNING BRANCH - GIS BRANCH

IN COOPERATION WITH THE

U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION

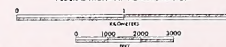
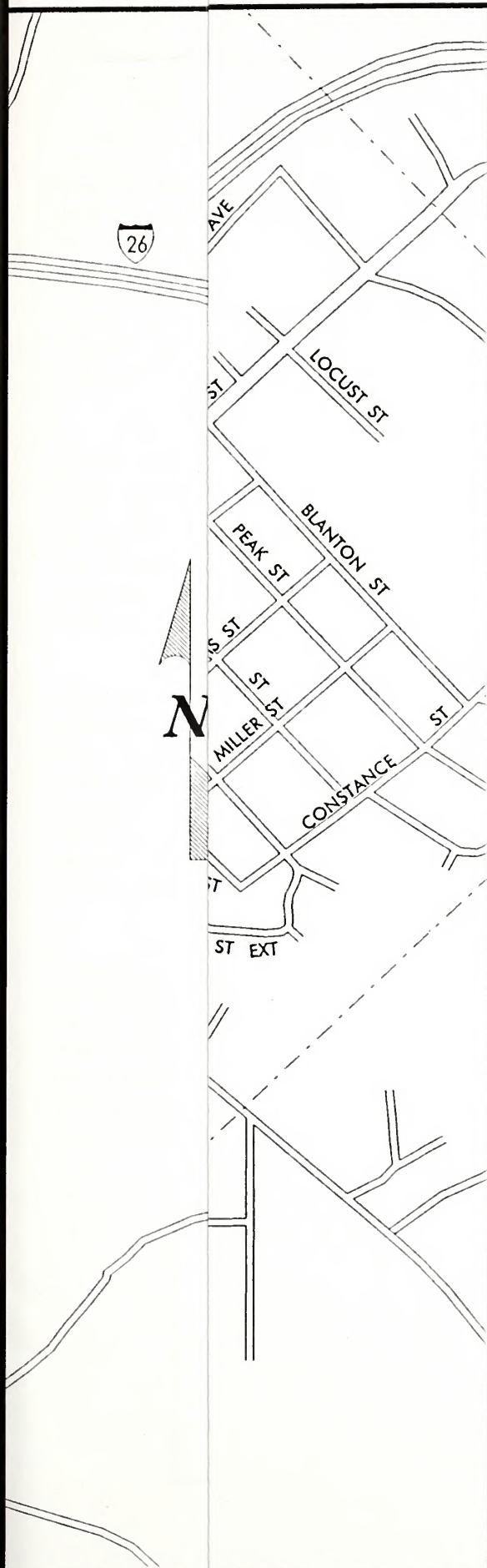


FIGURE 2





LEGEND

ROADS TO BE ADDED —————

ROADS TO BE REMOVED - - - - -

PROPOSED I-26 / US 74 INTERCHANGE IMPROVEMENT FOR COLUMBUS AND TRYON

AUGUST 28, 1995

**POLK COUNTY
NORTH CAROLINA**

PREPARED BY

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

STATEWIDE PLANNING BRANCH - GIS BRANCH

IN COOPERATION WITH THE

U.S. DEPARTMENT OF TRANSPORTATION

FEDERAL HIGHWAY ADMINISTRATION

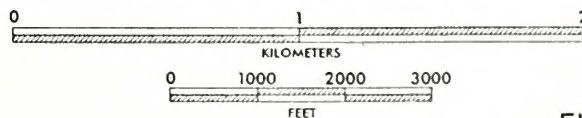


FIGURE 3





LEGEND

ROADS TO BE ADDED



ROADS TO BE REMOVED



PROPOSED I-26 / US 74 INTERCHANGE IMPROVEMENT FOR COLUMBUS AND TRYON

AUGUST 28, 1995

POLK COUNTY
NORTH CAROLINA

PREPARED BY

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
STATEWIDE PLANNING BRANCH - GIS BRANCH

IN COOPERATION WITH THE

U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION



FIGURE 3

EXCHANGE CUT FOR RD 1700

8. 1992

DATE
DRAWN

1/2 IN. = 100 FEET
1/4 IN. = 50 FEET

1/8 IN. = 25 FEET
1/16 IN. = 12.5 FEET
1/32 IN. = 6.25 FEET

1/64 IN. = 3.125 FEET
1/128 IN. = 1.5625 FEET

FIGURE 3

Construction Priorities, User Benefits, and Cost Estimates

The recommended improvements (refer to Figure 4) in this thoroughfare plan cannot be undertaken all at once, nor should they be. The need for projects is based on traffic projections for a twenty-nine year design period. Therefore, projects must be prioritized in order for realistic scheduling to be possible. In an effort to provide a common denominator to compare various improvement projects in the recommended Columbus and Tryon Thoroughfare Plan, an assessment has been made of the benefits that can be expected from the thoroughfare projects. These benefits and associated project costs are then used along with local input as a guide in prioritizing projects.

Three principal measures were used to estimate the benefits that would be derived from each project: road user cost savings; the potential for increased economic development resulting from the improvement; and the environmental impacts, both positive and negative, which may result. The first measure is an actual estimate of dollar savings, while the others are estimates of the probability of the resulting change. These measures are described below.

Reduced road user costs should result from any roadway improvement, from simple widening to the construction of a new roadway to relieve congested or unsafe conditions. Comparisons of the existing and proposed facility have been made in terms of vehicle operating costs, travel time cost, and accident costs. These user benefits are computed as total dollar savings over the twenty-nine year design period using data such as project length, base year and design year traffic volumes, traffic speed, type of facility, and volume/capacity ratio.

The impact of a project on economic development potential is denoted as the probability that it will stimulate the economic development of an area by providing access to land with development potential and reducing transportation costs. It is a subjective estimate based on the knowledge of the proposed project, local development characteristics, and land development potential. The probability is rated on a scale from 0 (none) to 1.00 (excellent), along with the following intermediate levels:

Table 1. Probability Estimation Guide	
Subjective Evaluation	Impact Probability
Excellent - very substantial	1.00
Very good - substantial	0.75
Good - considerable	0.50
Fair - some	0.25
Poor - none	0.00

The environmental impact analysis considers the effect of a project on the physical, social and cultural, and economic environment. Many of these have been accounted for in the evaluation of the project with respect to user benefits, cost, and economic development potential. However, there are twelve environmental factors generally not considered in these evaluations. They are the environmental impacts of a project on: (1) air quality; (2) water resources; (3) soils and geology; (4) wildlife; (5) vegetation; (6) housing and neighborhoods; (7) noise; (8) educational facilities; (9) churches; (10) parks and recreational facilities; (11) historic sites; and (12) public health and safety. The summation of both positive and negative impact probabilities with respect to these factors provides a measure of the relative environmental impact of a project.

Table 2. Environmental Considerations		
Physical Soils and Geology	Social/Cultural Environment	Economic Environment
Air Quality	Housing and Neighborhoods	Businesses
Water Resources	Noise	Employment
Soils and Geology	Educational Facilities	Economic Development
Wildlife	Churches	Public Utilities
Vegetation	Parks and Recreational Facilities	Transportation Costs
	Historic Sites and Landmarks	Capital Costs
	Public Health and Safety	Operation and Maintenance Costs
	National Defense	
	Aesthetics	

Offsetting the benefits that would be derived from any project is the cost of its construction. A new facility, despite its projected benefits, might prove to be unjustified due to the excessive costs involved in construction. The highway costs estimated in this report are based on the average statewide construction costs for similar project types. An estimate of

anticipated right-of-way costs is also included. Table 3 evaluates the proposed Columbus and Tryon improvements with respect to user benefits, estimated costs, probability of economic development, and environmental impact.

To guide both the State and the local municipalities in their efforts to implement the improvements recommended in this report, the proposed projects have been placed in order of priority (refer to Table 3). These projects have been prioritized based on local input as well as benefits and associated project costs.

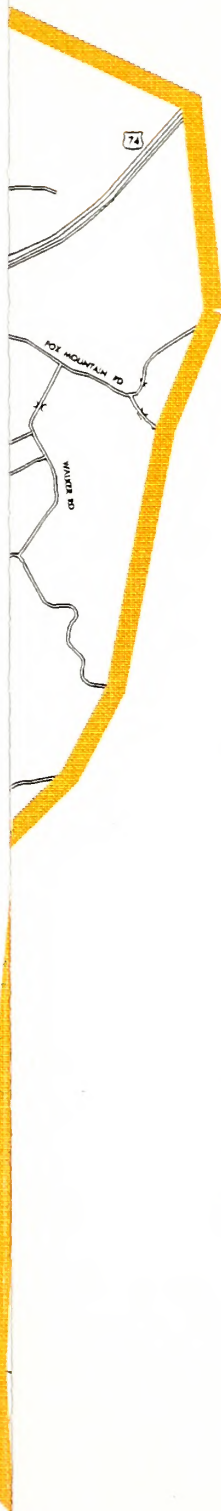
**Table 3. Columbus and Tryon Thoroughfare Plan
Cost Estimates - Benefits - and Probable Impacts**

Description	Const. Cost \$1000	ROW Cost \$1000	Total Cost \$1000	User Benefits \$1000	Economic Development	Environmental Impacts	
						Positive	Negative
1) Widen NC 108 to four lanes with turn lanes at I-26, the industrial entrances, the high school, and the hospital; and a traffic signal at I-26 Note: The Town of Columbus is against widening, but is for addition of turn lanes and the traffic signal	6715	77	6792	104021	.25	+.60	-.20
2) Widen US 176 to four lanes Note: The Town of Tryon is against widening	1216	11	1227	12867	.25	+.50	-.15
3) Widen West Howard Street	135	0	135	*	0	+.75	0
4) Realign intersection of New Market Road and McCown Street	**	**	**	**	0	+.50	-.10
5) Improve I-26 and US 74 interchange (Long Range)	***	***	***	***	0	+.50	-.10

* This project will allow safe and efficient movement of emergency vehicles. Therefore, benefits were not estimated.

** This project is for safety reasons. Therefore, benefits not estimated. Because this is a realignment project, costs were not estimated.

*** This project is recommended as a long term improvement. Therefore, cost and benefits were not estimated. Refer to Figure 3, page 13.



LEGEND

3 - LANE	
4 - LANE	
5 - LANE	
INTERCHANGE IMPROVEMENT	
REALIGNMENT	
PLANNING AREA BOUNDARY	
REFER TO WRITTEN CONSTRUCTION PRIORITIES	

RECOMMENDED IMPROVEMENTS FOR COLUMBUS AND TRYON

AUGUST 28, 1995

POLK COUNTY
NORTH CAROLINA

PREPARED BY

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
STATEWIDE PLANNING BRANCH - GIS BRANCH

IN COOPERATION WITH THE

U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION

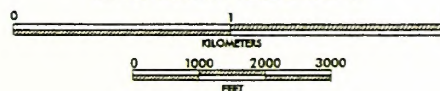
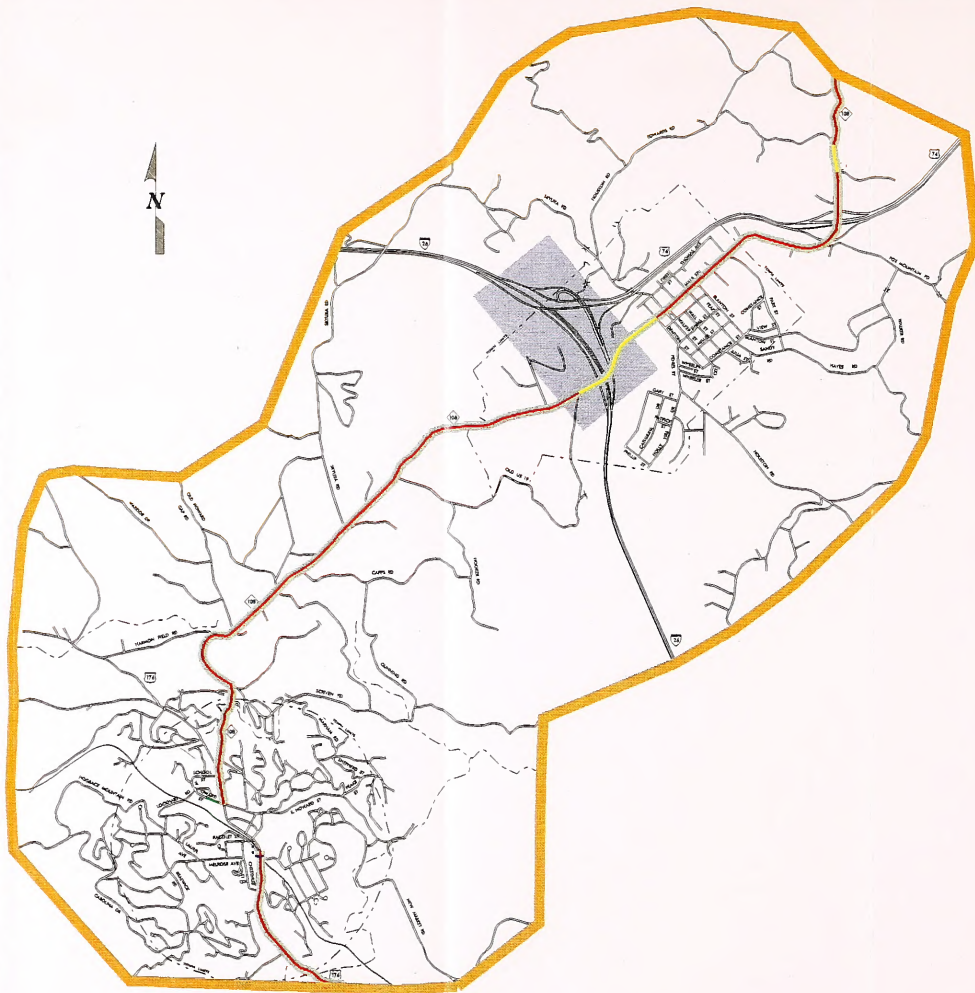


FIGURE 4



LEGEND

- 3 - LANE —
- 4 - LANE —
- 5 - LANE —
- INTERCHANGE IMPROVEMENT
- REALIGNMENT - - - - -
- PLANNING AREA BOUNDARY —
- REFER TO WRITTEN
CONSTRUCTION PRIORITIES —

RECOMMENDED IMPROVEMENTS FOR COLUMBUS AND TRYON

AUGUST 28, 1995

POLK COUNTY
NORTH CAROLINA

PREPARED BY
NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
STATEWIDE PLANNING BRANCH - GIS BRANCH

IN COOPERATION WITH THE
U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION

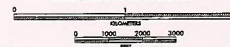


FIGURE 4



III. Implementation

Implementation is one of the most important aspects of the transportation plan. Unless implementation is an integral part of the process, the effort and expense associated with developing a plan is lost. To neglect the implementation process is a three-fold loss: the loss of the capital expenditures used in developing a plan; the opportunity cost of the capital expenditures; and, most importantly, the loss of the benefits which would accrue from an improved transportation system.

There are several administration controls and implementation tools which can aid in the implementation of a thoroughfare plan. They are generally mandated through Federal and State Legislation. They include: Mutual Adoption of the Thoroughfare Plan; Subdivision Regulations; Zoning Ordinances; Future Street Lines; Capital Improvements Programs; Official Maps; Urban Renewal; and Development Reviews. Generally, two issues play a major role in the implementation process -- available finances and citizen involvement. Effective use of the controls and tools listed above are indicative of good planning and minimize the effects of limited finances and negative citizen reaction to specific elements of a plan. It is through good planning that maximum use is made of every available dollar and that citizen involvement and approval of the transportation plan is obtained.

State and Municipal Adoption of the Thoroughfare Plan

Chapter 136, Article 3A, Section 136-66.2 of the General Statutes of North Carolina provides that after development of a thoroughfare plan, the plan may be adopted by the governing body of the municipality and the Department of Transportation to serve as the basis for future street and highway improvements. The General Statutes also require that, as part of the plan, the governing body of the municipality and the Department of Transportation shall reach agreement on responsibilities for existing and proposed streets and highways included in the plan. Facilities which are designated as a State responsibility will be constructed and maintained by the Division of Highways. Facilities which are designated as a municipal responsibility will be constructed and maintained by the municipality.

After mutual plan adoption, the Department of Transportation will initiate negotiations leading to determining which of the existing and proposed thoroughfares will be a Department responsibility and which will be a municipal responsibility. Chapter 136, Article 3A, Section 136-66.1 of the General Statutes provides guidance in the delineation of responsibilities. In summary, these statutes provide that the Department of Transportation shall be responsible for those facilities which serve volumes of through-traffic and traffic from outside the area to major business, industrial, governmental, and institutional

destinations located inside the municipality. The municipality is responsible for those facilities which serve primarily internal travel.

Subdivision Control

A subdivision ordinance requires that every subdivider submit to the Town Planning Commission a plot of his or her proposed subdivision. Certain standards must be met by the developer before he or she can be issued a building permit to construct the development. Through this process, it is possible to reserve or protect the necessary right-of-way for proposed streets which are a part of the thoroughfare plan and to require street construction in accordance with the plan.

This tool would be applicable to the long range improvement of the I-26/US 74/NC 108 interchange. Requiring set-backs would reduce the disruption of homes and businesses due to the construction of a new interchange.

Zoning Ordinances

A zoning ordinance can be beneficial to thoroughfare planning by designating appropriate locations of various land uses and allowable densities of residential development. This provides a degree of stability on which to make future traffic projections and to plan streets and highways.

Other benefits of a good zoning ordinance are: (1) the establishment of standards of development which will aid traffic operations on major thoroughfares; and (2) the minimization of strip commercial development which creates traffic friction and increases the traffic accident potential.

The Towns' zoning ordinances should be structured to control strip development along the thoroughfares. NC 108 and US 176 in Columbus and Tryon already have some strip development. Continuing to allow this type of development without strict zoning controls will increase traffic congestion on this facility.

Future Street Lines

The Future Street Line Ordinance is beneficial where the widening of a street will be necessary at some time in the future. A municipality, with legislative approval, may amend its charter to be empowered to adopt future street line ordinances. Through a metes-and-bounds description of a street's future right-of-way requirements, the Town may prohibit new construction or reconstruction of structures within the future right-of-way. This approach requires specific design of a facility and would usually require surveys and public hearings to let affected property owners to know what to expect and to allow them to make necessary

adjustments without undue hardships. A specific ordinance can be enacted for several streets.

This tool would be applicable to the recommended widening of NC 108 and US 176, if at a future date, the local municipalities were to decide it was needed.

Recommended right-of-way and street cross-sections for these thoroughfares are given in Appendix B.

Capital Improvements Program

One of the tools which makes it easier to build a planned thoroughfare system is a Capital Improvements Program. This is a long range budget for street improvements, acquisition of right-of-way, and other capital improvements on the basis of projected revenues. Municipal funds should be available for construction of street improvements which are a municipal responsibility, right-of-way cost sharing on facilities designated a Division of Highways responsibility, and advance purchase of right-of-way where such action is warranted.

Historically, cities and towns have depended a great deal on Federal or State funding to solve their transportation problems. Chapter 136, Article 3A, of the Road and Highway Laws of North Carolina Highway Bill 1211, passed in 1988, limits the role of municipalities to specific limits in right-of-way cost sharing. Set-back regulations, right-of-way dedications, and reservations play a major role in the ultimate cost of many facilities. Only in special cases will the municipality be able to enjoy the benefits of highway improvement without some form of investment.

Official Maps

The Roadway Corridor Official Map (or Official Street Map) is a document, adopted by the legislative body of the community, that pinpoints and preserves the location of proposed streets against encroachment. In effect, the official map serves notice on developers that the State or municipality intends to acquire certain property. The official map serves as a positive influence for sound development by reserving sites for public improvements in anticipation of actual need.

The North Carolina Department of Transportation (NCDOT) limits the use of official maps to large scale, fully access controlled facilities planned for rapidly developing areas outside of municipal jurisdictions. For projects within municipal jurisdictions, official maps should be prepared and adopted by the local government. Municipalities may adopt official maps that extend beyond its extraterritorial jurisdiction with approval from the Board of Commissioners.

It should be recognized that an official map places severe but temporary restrictions on private property rights. These restrictions are in the form of a prohibition, for up to three years, on the issuance of building permits or the approval of subdivisions on property lying within an official map alignment. The three year reservation period begins with the request for development approval. This authority should be used carefully and only in cases where less restrictive powers are found to be ineffective.

The general statute establishing the Official Street Map authority is fairly explicit in outlining the procedures to be followed and the types of projects to be considered. As required by the statute, a project being considered for an Official Street Map must be programmed in the State's Transportation Improvement Program (TIP) or included in a locally adopted Capital Improvements Program in addition to appearing on the adopted street system plan. The statute states that the Capital Improvements Program must be for a period of ten years or less and must identify the estimated cost of acquisition and construction of the proposed project as well as the anticipated financing.

The Program Development Branch of the North Carolina Department of Transportation is responsible for facilitating the adoption of Official Street Maps. Cities considering Official Street Map projects should contact this Branch for a copy of "Guidelines for Municipalities Considering Adoption of Roadway Corridor Maps" at:

NC Department of Transportation
Program Development Branch
Post Office Box 25210
Raleigh, NC 27611

Urban Renewal

Urban renewal plays a minor role in the transportation planning implementation process in terms of scope and general influence. However, under the right circumstances, renewal programs can make significant contributions. Provisions of the New Housing Act of 1974 (as amended) call for the conservation of slum areas. In the course of renewal, it is important to coordinate with the Thoroughfare Plan to see if additional setbacks or dedication of rights-of-way are needed.

Continued use of urban renewal programs to improve the transportation system is encouraged. Changes that can be made under this program are generally not controversial or disruptive compared to the clearance of a significant area.

Development Reviews

Driveway access to a State-maintained street or highway is reviewed by the District Engineer's office and by the Traffic Engineering Branch of the North Carolina Department of Transportation prior to access being permitted. Any development expected to generate large volumes of traffic (eg. shopping centers, fast food restaurants, large industries, etc.) may be comprehensively studied by staff from the Traffic Engineering, Statewide Planning, and Roadway Design Branches of NCDOT. If done at an early stage, it is often possible to significantly improve the development's accessibility at minimal expense. Since the municipality is the first point of contact for developers, it is important that the municipality advise them of this review requirement and cooperate in the review process. Use of developmental reviews could help control increasing traffic and congestion along NC 108 and US 176 in Columbus and Tryon.

Other Funding Sources

1. Assess user impact fees to fund transportation projects. These fees, called "facility fees" in the legislation, are to be based upon "reasonable and uniform considerations of capital costs to be incurred by the town as a result of new construction. The facility fee must bear a direct relationship to additional or expanded public capital costs of the community service facilities to be rendered for the inhabitants, occupants of the new construction, or those associated with the development process".
2. Enact a bond issue to fund street improvements.
3. Continue to work with NCDOT to have local projects included in the Transportation Improvement Program (TIP).
4. Consider the possibility of specific projects qualifying for federal demonstration project funds.
5. Adopt a collector street plan that would assess buyer or property owners for street improvement.
6. Charge a special assessment for utilities; for example, increase water and sewer bills to cover the cost of street improvements.
7. Lobby for the use of Small Urban and Discretionary Funds. These are funds that the Board of Transportation Member may use at his or her discretion for area road projects.
8. Request federal assistance through the U. S. Department of Housing and Urban Development, including Community Revitalization Block Grants (which can be used to

construct local streets), and Economic Development Grants.

9. Apply for grants and loans for public works and development facilities from other Federal agencies, for example, Small Business Development, etc.

IV. Thoroughfare Planning Principles

Objectives

Typically, the urban street system occupies 25 to 30 percent of the total developed land in an urban area. Since the system is permanent and expensive to build and maintain, much care and foresight are needed in its development. Thoroughfare planning is the process that public officials use to assure the development of the most appropriate street system that will meet existing and future travel desires within the urban area.

The primary aim of a thoroughfare plan is to guide the development of the urban street system in a manner consistent with the changing traffic patterns. A thoroughfare plan will enable street improvements to be made as traffic demands increase, and it helps eliminate unnecessary improvements, so needless expense can be averted. By developing the urban street system to keep pace with increasing traffic demands, a maximum utilization of the system can be attained, requiring a minimum amount of land for street purposes. In addition to providing for traffic needs, the thoroughfare plan should embody those details of good urban planning necessary to present a pleasing and efficient urban community. The location of present and future population, commercial, and industrial development affects major street and highway locations. Conversely, the location of major streets and highways within the urban area will influence the urban development pattern.

Other objectives of a thoroughfare plan include:

1. providing for the orderly development of an adequate major street system as land development occurs;
2. reducing travel and transportation costs;
3. reducing the cost of major street improvements to the public through the coordination of the street system with private action;
4. enabling private interests to plan their actions, improvements, and development with full knowledge of public intent;
5. minimizing disruption and displacement of people and businesses through long range advance planning for major street improvements;
6. reducing environmental impacts, such as air pollution, resulting from transportation; and
7. increasing travel safety.

Thoroughfare planning objectives are achieved through both improving the operational efficiency of thoroughfares and improving the system's efficiency through system coordination and layout.

Operational Efficiency

A street's operational efficiency is improved by increasing the capability of the street to carry more vehicular traffic and people. In terms of vehicular traffic, a street's capacity is defined by the maximum number of vehicles which can pass a given point on a roadway during a given time period under prevailing roadway and traffic conditions. Capacity is affected by the physical features of the roadway, nature of traffic, and weather.

Physical ways to improve vehicular capacity include street widening, intersection improvements, improving vertical and horizontal alignment, and eliminating roadside obstacles. For example, widening of a street from two to four lanes more than doubles the capacity of the street by providing additional maneuverability for traffic. This reduces the impedances to traffic flow caused by slow moving or turning vehicles and the adverse effects of horizontal and vertical alignments.

Operational ways to improve street capacity include:

1. Control of access -- A roadway with complete access control can often carry three times the traffic handled by a non-controlled-access street with identical lane width and number.
2. Parking removal -- Parking removal increases capacity by providing additional street width for traffic flow and reducing friction to flow caused by parking and unparking vehicles.
3. One-way operation -- The capacity of a street can sometimes be increased 20-50%, depending upon turning movements and overall street width, by initiating one-way traffic operations. One-way streets can also improve traffic flow by decreasing potential traffic conflicts and simplifying traffic signal coordination.
4. Reversible lanes -- Reversible traffic lanes may be used to increase street capacity in situations where heavy directional flows occur during peak periods.
5. Signal phasing and coordination -- Uncoordinated signals and poor signal phasing restrict traffic flow by creating excessive stop-and-go operation.
6. Intelligent Transportation System (ITS) - This involves applying advanced concepts and technology in the area of

communications, navigation, and information systems to provide solutions to traffic congestion and at the same time improve (highway) safety and reduce environmental effects. It covers passengers, freight, and public transit vehicles and fleets. The ITS Program is structured according to five major systems areas. They are:

- a. Advanced Traffic Management Systems - Provides real-time adjustment of traffic control systems and real-time means for transportation operators to effectively monitor traffic conditions and communicate to devices, quickly adjust traffic operations, and promptly respond to incidents.
 - b. Advanced Traveler Information Systems - Provides continuous advice regarding traffic conditions, alternate routes, and warnings regarding road safety.
 - c. Commercial Vehicle Operations - Improves operations efficiency and productivity of trucks, buses, and other fleets of vehicles and improves the efficiency of necessary regulatory activities.
 - d. Advanced Vehicle Control Systems - Vehicle and/or roadway based electromechanical and communication devices that enhance the control of vehicles by facilitating and augmenting driver performance and ultimately relieving the driver of most tasks on designated instrumented roadways.
 - e. Advanced Public Transportation Systems - Provides mass transport users and operators (e.g. buses, vanpoolers, high-occupancy vehicle lanes, carpools, taxicabs) with up-to-date information on status, schedules, and availability of public transit systems including automatic vehicle location and monitoring systems to improve fleet management as well as electronic free media.
 - f. Advanced Rural Transportation Systems - Applies ITS technologies (including route guidance, two-way communications, automatic vehicle location, automatic emergency signaling, incident detection, and roadway edge detection) to rural needs.
7. High-Occupancy Vehicle Lanes (HOV Lanes) - This involves designating existing traffic lanes for exclusive use by high-occupancy vehicles like carpools, vanpools, and buses. These can be altered according to demand to increase capacity. For example, HOV lanes can be designated HOV only during peak hours and/or can be reversible between the morning and afternoon peak hours to reflect the shift in directional flow of traffic.

Altering travel demand is a third way to improve the efficiency of existing streets. Travel demand can be reduced or altered in the following ways.

1. Encourage people to form carpools and vanpools for journeys to work and other trip purposes. This reduces the number of vehicles on the roadway and raises the "people-carrying" capability of the street system.
2. Encourage the use of transit and bicycle modes.
3. Encourage industries, businesses, and institutions to stagger work hours or establish variable work hours for employees. This will spread peak travel over a longer time period and thus reduce peak hour demand.
4. Plan and encourage land use development or redevelopment in a more travel efficient manner.

System Efficiency

Another means for altering travel demand is the development of a more efficient system of streets that will better serve travel desires. A more efficient system can reduce travel distances, time, and cost to the user. Improvements in system efficiency can be achieved through the concept of functional classification of streets and development of a coordinated major street system.

Functional Classification

Streets perform two primary functions -- traffic service and land service. When combined, these services are basically incompatible. The conflict is not serious if both traffic and land service demands are low. However, when traffic volumes are high, conflicts created by uncontrolled and intensely used abutting property leads to intolerable traffic flow friction and congestion.

The underlying concept of the thoroughfare plan is that it provides a functional system of streets that permits travel from origins to destinations with directness, ease, and safety. Different streets in the system are designed and called on to perform specific functions, thus minimizing the traffic and land service conflict. Streets are categorized by function as local access streets, minor thoroughfares, or major thoroughfares. This is shown in Figure 5.

Local Access Streets provide access to abutting property. They are not intended to carry heavy volumes of traffic and should be located such that only traffic with origins and destinations on these streets would be served. Local streets may be further

classified as either residential, commercial, and/or industrial depending upon the type of land use they serve.

Minor Thoroughfares are more important streets on the city system. They collect traffic from local access streets and carry it to the major thoroughfares. They may in some instances supplement the major thoroughfare system by facilitating minor through-traffic movements. A third function that may be performed is that of providing access to abutting property. They should be designed to serve limited areas so that their development as major thoroughfares will be prevented.

Major Thoroughfares are the primary traffic arteries of the city. Their function is to move intra-city and inter-city traffic. The streets which comprise the major thoroughfare system may also serve abutting property; however, their principle function is to carry traffic. They should not be bordered by uncontrolled strip development because such development significantly lowers the capacity of the thoroughfare to carry traffic. In addition, each driveway is a danger and an impediment to traffic flow. Major thoroughfares may range from two-lane streets carrying minor traffic volumes to major expressways with four or more traffic lanes. Parking normally should not be permitted on major thoroughfares.

Idealized Major Thoroughfare System

A coordinated system of major thoroughfares forms the basic framework of the urban street system. A major thoroughfare system which is most adaptable to desired lines of travel within an urban area is the radial-loop system. It permits movement between various areas of the city within maximum directness. This system consists of several functional elements--radial streets, crosstown streets, loop system streets, and bypasses. These functional elements are shown in Figure 5.

Radial streets provide for traffic movement between points located on the outskirts of the city and the central area. This is a major traffic movement in most cities, and the economic strength of the central business district depends upon the adequacy of this type of thoroughfare.

Cross-town streets are designed to prevent congestion in the central business district. If all radial streets crossed in the central area, an intolerable congestion problem would result. To avoid this problem, it is important to have a system of crosstown streets which form a loop around the central business district. This system allows traffic moving from origins on one side of the central area to destinations on the other side to follow the area's border. It also allows central area traffic to circle and then enter the area near a given destination. The effect of a good crosstown system is to free the central area of crosstown

traffic, thus permitting the central area to function more adequately in its role as a business or pedestrian shopping area.

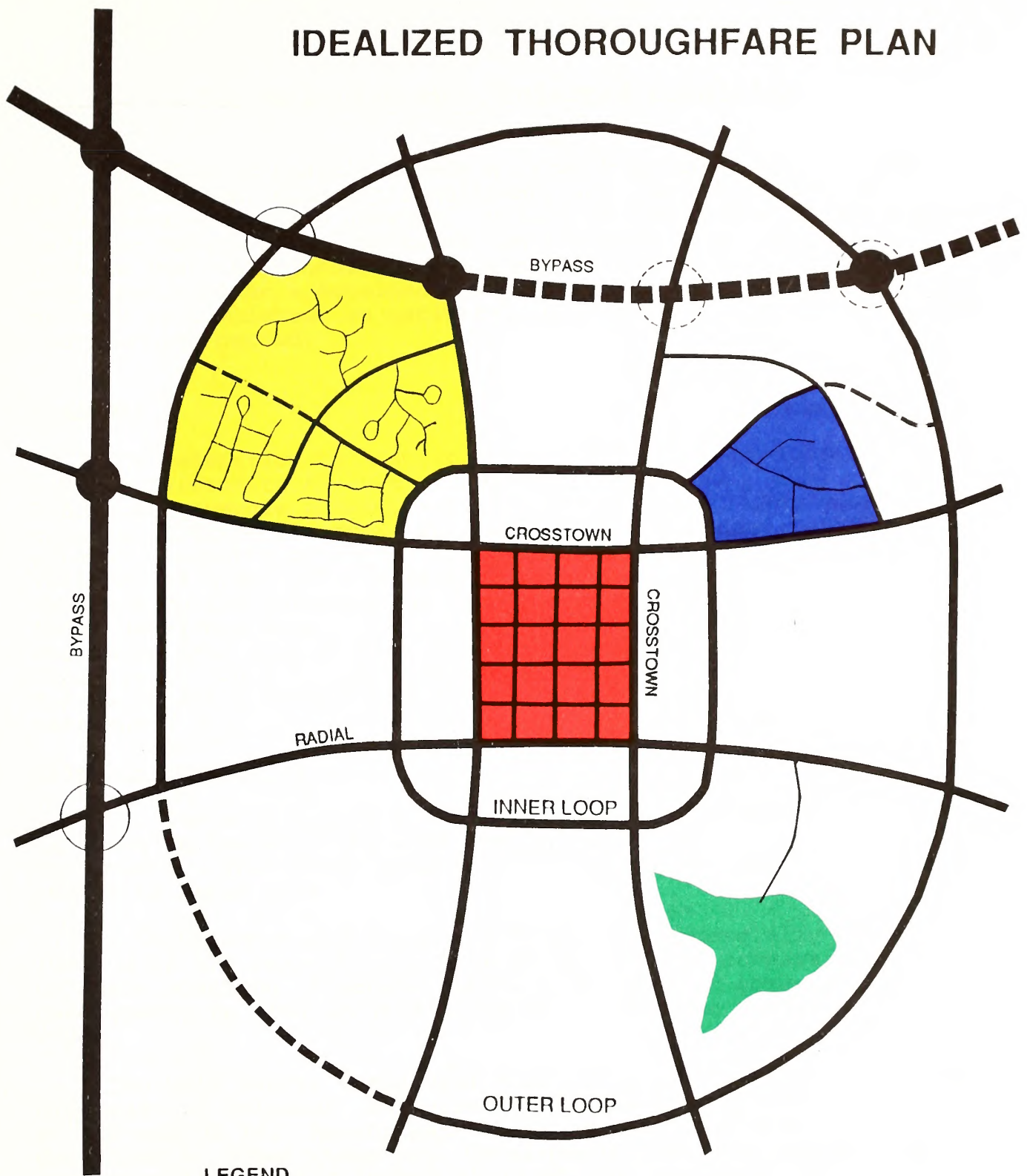
Loop system streets move traffic between suburban areas of the city. Although a loop may completely encircle the city, a typical trip may be from an origin near a radial thoroughfare to a destination near another radial thoroughfare. Loop streets do not necessarily carry heavy volumes of traffic, but they function to help relieve central areas. There may be one or more loops, depending on the size of the urban area. They are generally spaced one-half mile to one mile apart, depending on the intensity of land use.

A bypass is designed to carry traffic through or around the urban area, thus providing relief to the city street system by removing traffic which has no desire to be in the city. Bypasses are usually designed to through-highway standards, with control of access. Occasionally, a bypass with low traffic volumes can be designed to function as a portion of an urban loop. The general effect of bypasses is to expedite the movement of through-traffic and to improve traffic conditions within the city. By freeing the local streets for use by shopping and home-to-work traffic, bypasses tend to increase the economic vitality of the local area.

Application of Thoroughfare Planning Principles

The concepts presented in the discussion of operational efficiency, functional classification, and idealized major thoroughfare system are the conceptual tools available to the transportation planner in developing a thoroughfare plan. In actual practice, a thoroughfare plan is developed for established urban areas and is constrained by the existing land use and street patterns, existing public attitudes and goals, and current expectations of future land use. Compromises must be made because of these constraints and the many other factors that affect major street locations.

IDEALIZED THOROUGHFARE PLAN



LEGEND

	EXISTING	PROPOSED		LAND USES
MAJOR THOROUGHFARE FREEWAY				COMMERCIAL/BUSINESS
MAJOR OTHER				RESIDENTIAL
MINOR THOROUGHFARE				INDUSTRIAL
LOCAL ROAD				PUBLIC/INSTITUTIONAL
INTERCHANGE				
GRADE SEPERATION				

FIGURE 5

IDEALIZED THOROUGHFARE PLAN



LAND USE	SYMBOL
COMMERCIAL ZONE	[Red Square]
RESIDENTIAL	[Yellow Triangle]
INDUSTRIAL	[Light Blue Triangle]
RECREATION	[Green Area]

STREET TYPE	SYMBOL
THOROUGHFARE	[Thick Line]
LOCAL STREET	[Thin Line]
ALLEY	[Dashed Line]

TRAFFIC CONTROL	SYMBOL
ONE WAY	[Arrow]
STOP	[Octagon]

V. Existing and Projected Conditions

The flow of traffic within a network is based on the land use, population, economic conditions, and conditions of the travelways within the network. Before an accurate estimate can be made for future travel patterns, an accurate investigation of present land use, population, economy, and road usage must be completed. After a detailed analysis of the travelways within the network is completed, an estimate can be made of future travel for the planning period.

Land Use

The generation of traffic on a particular thoroughfare is closely related to the use of adjacent land areas. Some types of land uses generate much more traffic than others. For example, a commercial or retail area, such as a shopping center, will generate (or attract) much larger volumes of traffic than a residential area. The attraction between different land uses varies with the intensity of development and the distance between those developed areas. Therefore, it becomes necessary to designate land uses by type for transportation planning. An analysis of the existing land use distribution serves as a basis for forecasting future land use needs and the resulting travel patterns.

Existing Conditions

The Towns of Columbus and Tryon are both largely residential, as shown on the existing land use map in Figure 6. There are few apartments. This area has mostly single family dwelling units on medium to large lots.

Both Columbus and Tryon are developed commercially along NC 108 and US 176 respectively from their northern corporate limits to their southern corporate limits. An area of commercial development is also located along NC 108 between Columbus and Tryon.

The Polk County Industrial Park is located approximately one mile east of Columbus' corporate limits at the intersection of NC 108 and US 74. Approximately 16% of the 106.7 acres is developed.¹ Other industrial development lies just beyond the corporate limits of Columbus along NC 108, just west of the corporate limits of Tryon along US 176, just inside the northern corporate limits of Tryon along NC 108, and at the intersection of NC 108 and SR 1543 in the section of county lying between Columbus and Tryon.

¹Polk County Land Use Plan (1992-2003)

Community facilities include three public schools and one community college. Tryon Elementary is located on School Street, Tryon Middle School is located on Harmon Field Road, Polk County High School is located on NC 108 just north of Columbus, and Isothermal Community College is located on NC 108 just south of Columbus. Other community facilities include the Polk County Sheriff's Department, the Columbus Police Department, the Tryon Police Department, the Columbus Fire Department, the Tryon Fire Department, town halls in both Columbus and Tryon, the Polk County Court House, most of the County administration offices, Saint Luke's Hospital, several nursing homes and rest homes, a senior center, and Tryon Estates Retirement Home.

Projected Conditions¹

The future land classification map for Columbus and Tryon is shown in Figure 7. Its purpose is to provide a guide for future development in the area. All of the land located within the corporate limits of both Columbus and Tryon is expected to be developed. In addition to completely developed land, the developed classification allows for minimal undeveloped land that has, or will have in a timely manner, city services.

NC 108 between Columbus and Tryon, a small area northeast of the corporate limits of Columbus, and a small area southeast of the corporate limits of Tryon are expected to be urban transitional. This classification is defined as land outside of the current corporate limits that is presently being developed or will be developed within the next five to ten years to accommodate projected urban growth.

Much of the land within a mile from the corporate limits of both Columbus and Tryon is anticipated to be limited transitional. Land classified as limited transitional will experience some growth, primarily residential, and will necessitate some services such as community water and sewer within the next ten years.

A small section of land to the northeast and a small section of land to the west of the corporate limits of Columbus will be considered rural. This classification includes land that is used for or is appropriate for agriculture, forestry, and mineral extraction.

Areas classified as conservation land in the future also fall within the planning area boundary. Land along the bank of the North Pacolet River and a section of land lying to the north and to the west of the corporate limits of Tryon is classified as conservation land. Ridgetops, excessive slopes, floodplains, wetlands, areas largely inhabited with wildlife, and areas providing cultural, natural, productive, recreational, or scenic resources are included in the conservation classification.

¹Polk County Land Use Plan (1992-2003)

Population Trends

Travel is directly related to the population of an area. The volume of traffic on a particular section of roadway is closely related to the size and the distribution of the population it serves. By studying past population counts, future projections can be estimated. Population trends and projections for Polk County, Columbus Township, Columbus, Tryon Township, and Tryon are shown in Table 4.

Table 4. Population Trends and Projections								
Location	1970	1980	Perc. Change	1990	Perc. Change	2000	2010	2020
Polk County	11735	12984	10.6%	14416	11.0%	15758 ¹	16677 ¹	17396 ¹
Columbus Township	2666	3241	21.6%	3992	23.2%	4364 ²	4618 ²	4817 ²
Columbus	731	727	-0.5%	812	11.7%	888 ²	939 ²	980 ²
Tryon Township	3850	3712	-3.6%	3630	-2.2%	3525 ³	3423 ³	3323 ³
Tryon	1941	1796	-7.5%	1680	-6.5%	1631 ³	1584 ³	1538 ³
¹ Projections for Polk County taken from NC Office of State Budget and Management ² Columbus Township and Columbus projections assumed the same growth rate per year as Polk County ³ Tryon Township and Tryon projections assumed the same growth rate per year as Tryon Township from 1970 to 1990								

As shown in Table 4, the population in Columbus is increasing slightly and the population in Tryon is decreasing slightly. The result is a combined population that is holding relatively steady. In the Columbus - Tryon area however, an increasing percentage of travel originates from outside of the immediate area. This combined with the completion of the new high school on NC 108 just north of the corporate limits of Columbus and the completion of US 74 from Columbus to Forest City, is expected to increase traffic through the area over the next 25 years.

Economy and Employment

The number of persons residing in any given area is a direct function of the number of jobs available in that area. For example, a decision by a large firm to build an industrial plant employing several hundred people would have an abrupt impact on an area's economy. It would provide a new incentive for people to move into that area. Secondary spin-offs of such a decision would include: an increased demand for new housing and services; increased retail sales and bank deposits; increased school enrollment; increased traffic; and several other benefits and costs associated with urban growth. The Polk County Industrial Park located just north of Columbus could allow for a situation such as this. A breakdown of employment by industry is shown in Table 5¹.

Table 5. Existing Industries		
Industry	Location	Number Employees
Wheaton Industries	Industrial Park	108
Wayne Wire Die Company		40
Polk County Sheltered Workshop		NA
Duke Power Warehouse Facility		NA
Kangaroo Products Company	Columbus	35
Milliken, Inc. - Hatch Mill	Columbus	200
Searcy Yarn Company	Columbus	12
Pure Country	Lynn	12
Barnet Southern	Tryon	40
Carolina Yarn Processors	Tryon	90
Dixie Yarns	Tryon	NA
Grover Industries	Tryon	110
NA - Not Available		

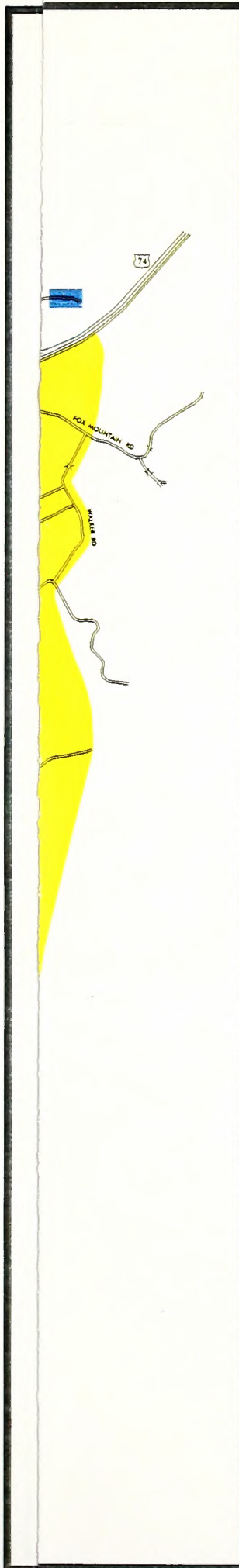
In addition to being largely supported by industries in the area, Tryon's economy is heavily supported by the retirement community. The high income of the retirement community actually distorts the average per capita income of the area.²

The economy of the Columbus - Tryon area is also supported by the equestrian sport. This area hosts annual equestrian foxhunts and steeplechases.





Other employment in the area includes farming, retail trade, domestic employment, and government employment.

¹Polk County Economic Development Commission

²Polk County Land Use Plan (1992-2003)



LEGEND

RESIDENTIAL	
COMMERCIAL	
RECREATIONAL	
INDUSTRIAL	

EXISTING LAND USE FOR COLUMBUS AND TRYON

AUGUST 28, 1995

POLK COUNTY
NORTH CAROLINA

PREPARED BY

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
STATEWIDE PLANNING BRANCH - GIS BRANCH

IN COOPERATION WITH THE

U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION

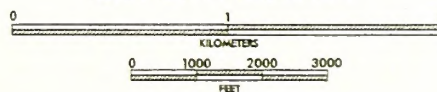


FIGURE 6

Economy and Employment

The number of persons residing in any given area is a direct function of the number of jobs available in that area. For example, a decision by a large firm to build an industrial plant employing several hundred people would have an abrupt impact on an area's economy. It would provide a new incentive for people to move into that area. Secondary spin-offs of such a decision would include: an increased demand for new housing and services; increased retail sales and bank deposits; increased school enrollment; increased traffic; and several other benefits and costs associated with urban growth. The Polk County Industrial Park located just north of Columbus could allow for a situation such as this. A breakdown of employment by industry is shown in Table 5¹.

Table 5. Existing Industries		
Industry	Location	Number Employees
Wheaton Industries	Industrial Park	108
Wayne Wire Die Company		40
Polk County Sheltered Workshop		NA
Duke Power Warehouse Facility		NA
Kangaroo Products Company	Columbus	35
Milliken, Inc. - Hatch Mill	Columbus	200
Searcy Yarn Company	Columbus	12
Pure Country	Lynn	12
Barnet Southern	Tryon	40
Carolina Yarn Processors	Tryon	90
Dixie Yarns	Tryon	NA
Grover Industries	Tryon	110
NA - Not Available		

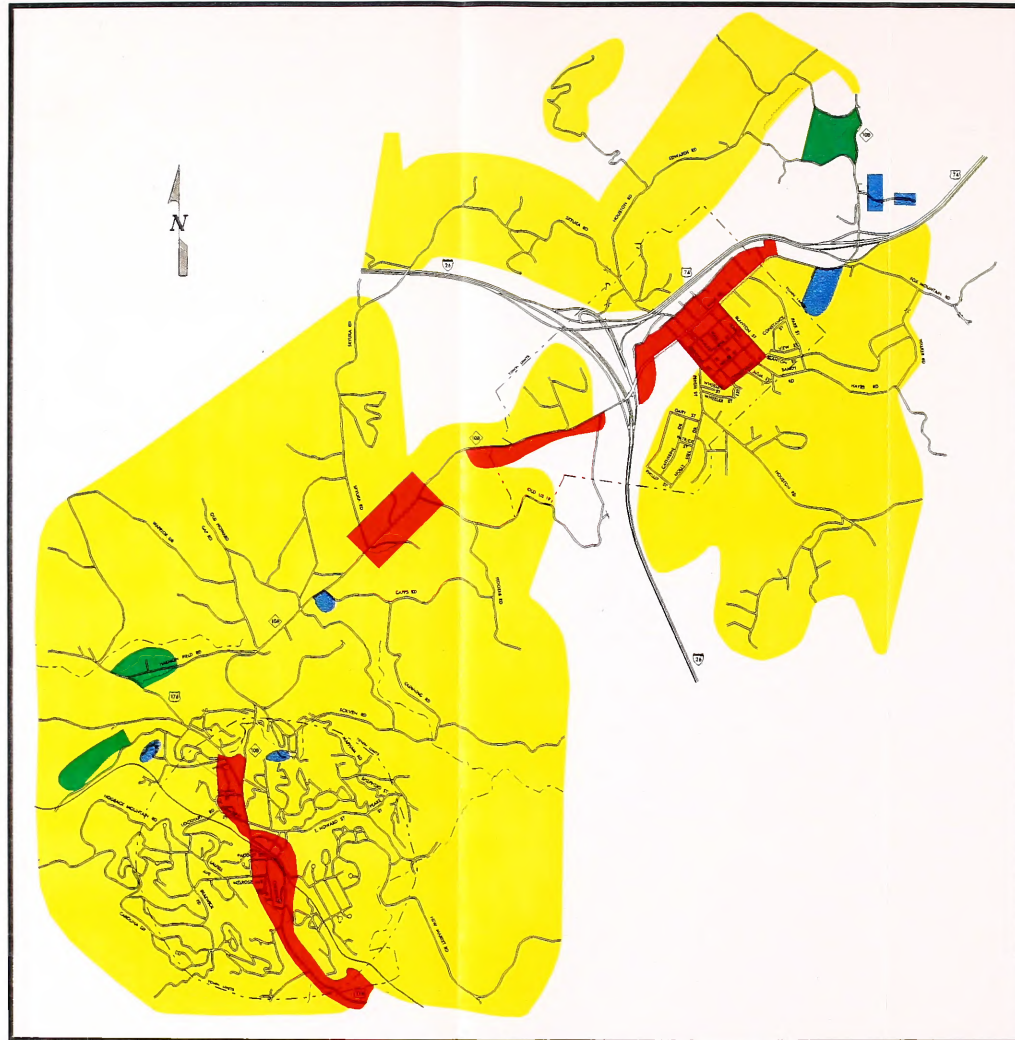
In addition to being largely supported by industries in the area, Tryon's economy is heavily supported by the retirement community. The high income of the retirement community actually distorts the average per capita income of the area.²

The economy of the Columbus - Tryon area is also supported by the equestrian sport. This area hosts annual equestrian foxhunts and steeplechases.

Other employment in the area includes farming, retail trade, domestic employment, and government employment.

¹Polk County Economic Development Commission

²Polk County Land Use Plan (1992-2003)



LEGEND

RESIDENTIAL
COMMERCIAL
RECREATIONAL
INDUSTRIAL



EXISTING LAND USE FOR COLUMBUS AND TRYON

AUGUST 28, 1995

POLK COUNTY
NORTH CAROLINA

PREPARED BY
NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
STATEWIDE PLANNING BRANCH - GIS BRANCH

IN COOPERATION WITH THE

U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION

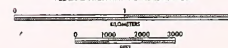


FIGURE 6

Figure 1

The map shows the distribution of the species in the study area. The species is found in the following areas: (1) the northern part of the study area, (2) the central part of the study area, and (3) the southern part of the study area.

The map also shows the distribution of the species in the following areas: (1) the northern part of the study area, (2) the central part of the study area, and (3) the southern part of the study area.

The map also shows the distribution of the species in the following areas: (1) the northern part of the study area, (2) the central part of the study area, and (3) the southern part of the study area.

FIGURE 1

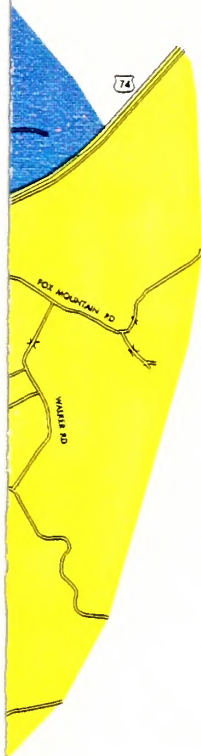


Figure 1

The map shows the distribution of the species in the study area. The species is found in the following areas: (1) the northern part of the study area, (2) the central part of the study area, and (3) the southern part of the study area.

The map also shows the distribution of the species in the following areas: (1) the northern part of the study area, (2) the central part of the study area, and (3) the southern part of the study area.

The map also shows the distribution of the species in the following areas: (1) the northern part of the study area, (2) the central part of the study area, and (3) the southern part of the study area.



LEGEND

DEVELOPED



URBAN TRANSITION



LIMITED TRANSITION



CONSERVATION



FUTURE LAND USE FOR COLUMBUS AND TRYON

AUGUST 28, 1995

POLK COUNTY
NORTH CAROLINA

PREPARED BY

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

STATEWIDE PLANNING BRANCH - GIS BRANCH

IN COOPERATION WITH THE

U.S. DEPARTMENT OF TRANSPORTATION

FEDERAL HIGHWAY ADMINISTRATION

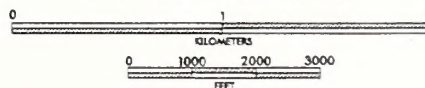


FIGURE 7

the first of these
the second of these
the third of these
the fourth of these
the fifth of these
the sixth of these
the seventh of these
the eighth of these
the ninth of these
the tenth of these

the first of these
the second of these
the third of these
the fourth of these
the fifth of these
the sixth of these
the seventh of these
the eighth of these
the ninth of these
the tenth of these

the first of these
the second of these
the third of these
the fourth of these
the fifth of these
the sixth of these
the seventh of these
the eighth of these
the ninth of these
the tenth of these

the first of these
the second of these
the third of these
the fourth of these
the fifth of these
the sixth of these
the seventh of these
the eighth of these
the ninth of these
the tenth of these

the first of these
the second of these
the third of these
the fourth of these
the fifth of these
the sixth of these
the seventh of these
the eighth of these
the ninth of these
the tenth of these

the first of these
the second of these
the third of these
the fourth of these
the fifth of these
the sixth of these
the seventh of these
the eighth of these
the ninth of these
the tenth of these

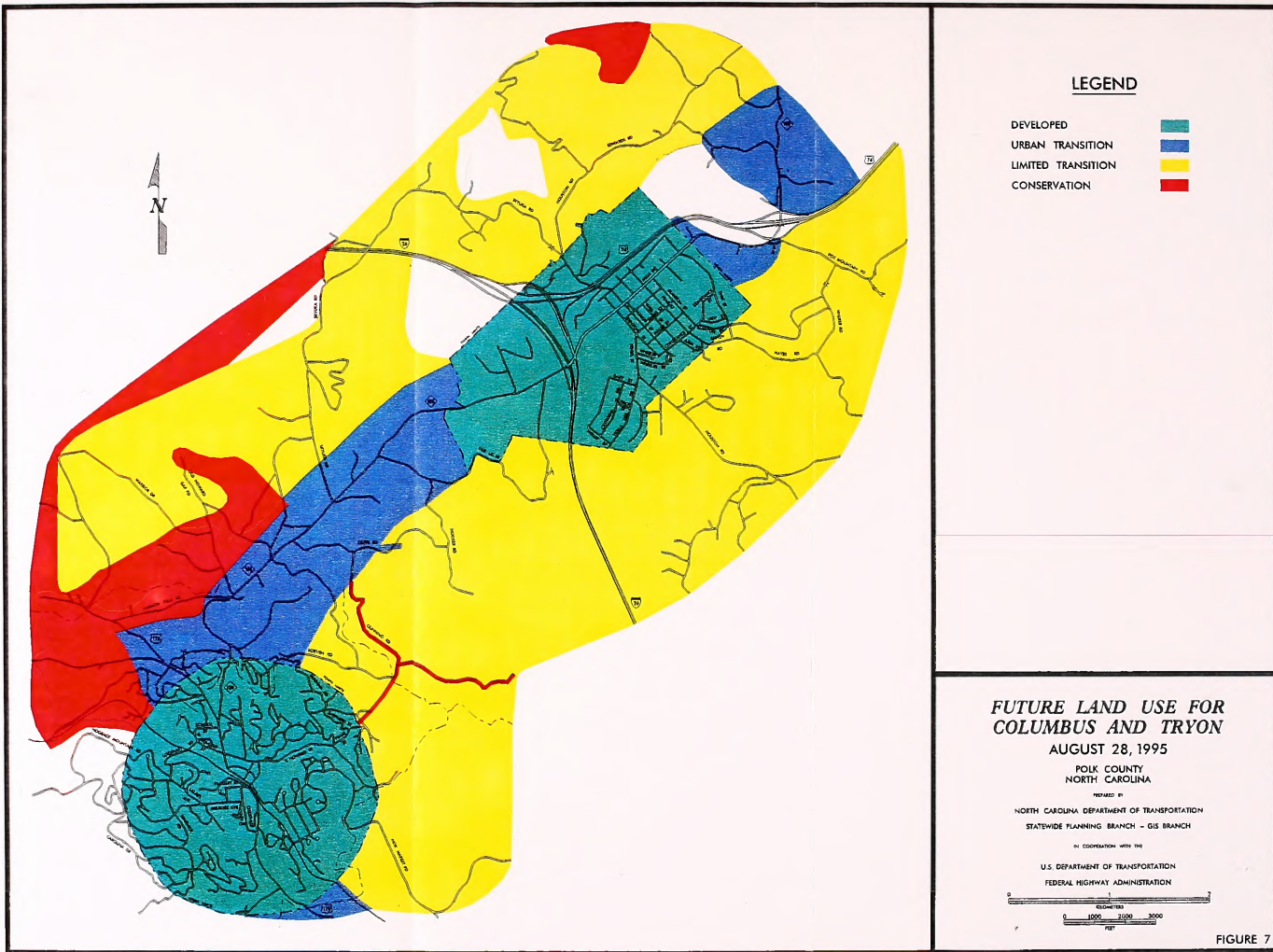


FIGURE 7



Major Routes

The Columbus - Tryon area is served primarily by I-26, US 176, US 74, and NC 108. I-26 and US 176 provide access to the Asheville, Hendersonville, and Spartanburg areas. US 176 also provides direct access to downtown Tryon. The newly completed US 74 provides a more direct access to Forest City and to the North Carolina coast. NC 108 connects Columbus and Rutherfordton. NC 108 also provides direct access to downtown Columbus and ends at US 176, providing direct access to Tryon.

Travel Demand

A good indication of the adequacy of the existing major street system is a comparison of the traffic volumes with the ability of the streets to move traffic freely at a desirable speed. A street's ability to move traffic is usually controlled by spacing of major intersections, width of pavement, restriction of parking and turning movements, and signalization.

Capacity is defined as the maximum number of vehicles that has a reasonable expectation of passing over a given section of a roadway during a given time period under prevailing roadway and traffic conditions.¹ The relationship of traffic volumes to the capacity of the roadway will determine the level of service being provided. Six levels of service (LOS) have been designated to identify the conditions existing under various speed and volume conditions on a highway or street. The six levels of service, as shown in Figure 8, are:

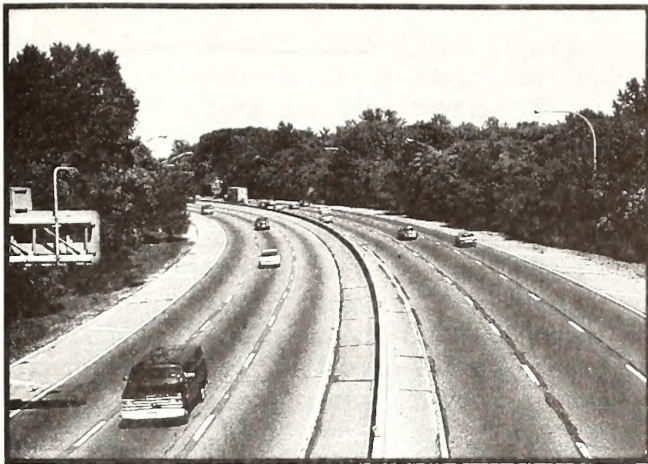
1. Level-of-service A represents free flow. Individual users are virtually unaffected by the presence of others in the traffic stream. Freedom to select desired speeds and to maneuver within the traffic stream is extremely high. The general level of comfort and convenience provided to the motorist, passenger, or pedestrian is excellent.
2. Level-of-service B is in the range of stable flow, but the presence of other users in the traffic stream begins to be noticeable. Freedom to select desired speeds is relatively unaffected, but there is a slight decline in the freedom to maneuver within the traffic stream from LOS A, because the presence of others in the traffic stream begins to affect individual behavior.
3. Level-of-service C is in the range of stable flow, but marks the beginning of the range of flow in which the operation of individual users becomes significantly affected by interactions with others in the traffic

¹ Highway Capacity Manual, Special Report 209, 1985, pp. 1-3.

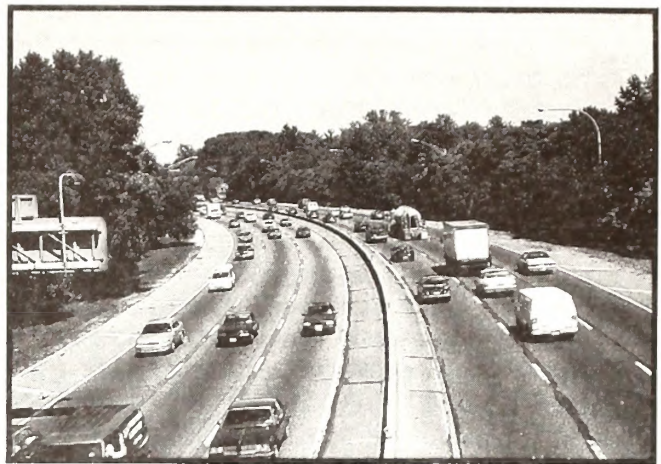
stream. The selection of speed is now affected by the presence of others. Driver and pedestrian frustration is generally high. Operations at this level are usually unstable, because small increases in flow or minor perturbations within the traffic stream will cause breakdowns. Maneuvering within the traffic stream requires substantial vigilance on the part of the user. The general level of comfort and convenience declines noticeably at this level.

4. Level-of-service D represents high-density, but stable flow. Speed and freedom to maneuver are severely restricted. The driver or pedestrian experiences a generally poor level of comfort and convenience. Small increases in traffic flow will generally cause operational problems at this level.
5. Level-of-service E represents operating conditions at or near the capacity level. All speeds are reduced to a low, but relatively uniform value. Maneuvering within the traffic stream is extremely difficult, and it is generally accomplished by forcing a vehicle or pedestrian to "give way" to accommodate such maneuvers.
6. Level-of-service F is used to define forced or breakdown flow. This condition exists wherever the amount of traffic approaching a point exceeds the amount which can traverse the point. Queues form behind such locations. Operations within the queue are characterized by stop-and-go waves, and they are extremely unstable. Vehicles may progress at reasonable speeds for several hundred feet or more, then be required to stop in a cyclic fashion. Level-of-service F is used to describe the operating conditions within the queue, as well as the point of the breakdown. In many cases, operating conditions of vehicles or pedestrians discharged from the queue may be quite good. It is the point at which arrival flow exceeds discharge flow which causes the queue to form. Level-of-service F is an appropriate designation for such points.

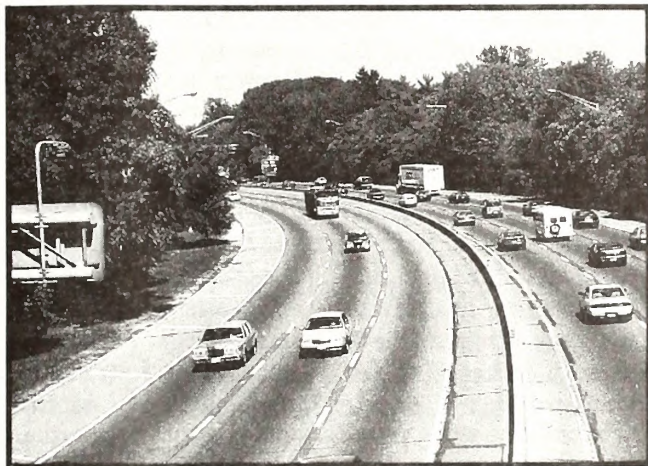
The recommended improvements and overall design of the Thoroughfare Plan were based on achieving a minimum of LOS D on existing facilities, and LOS C on new facilities. LOS D is considered the "**practical capacity**" of a facility, or that at which the public begins to express dissatisfaction.



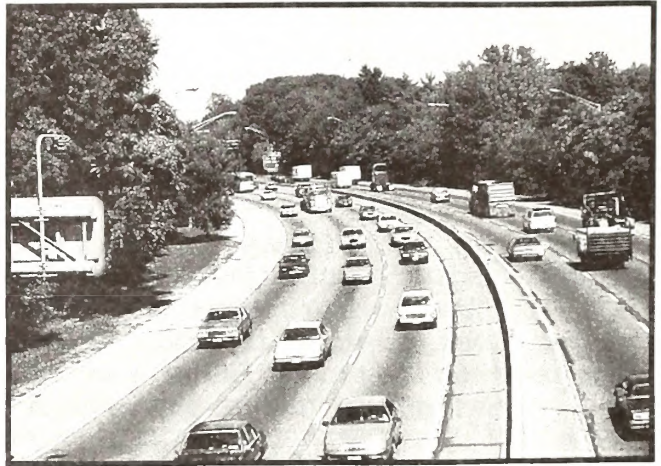
LOS A.



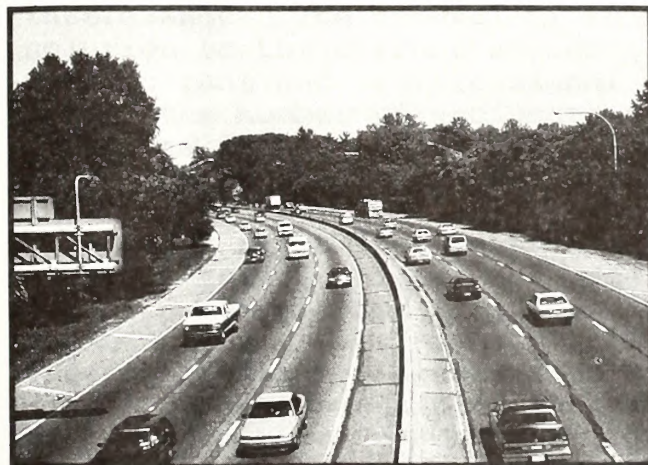
LOS D.



LOS B.



LOS E.



LOS C.



LOS F.

LEVELS OF SERVICE

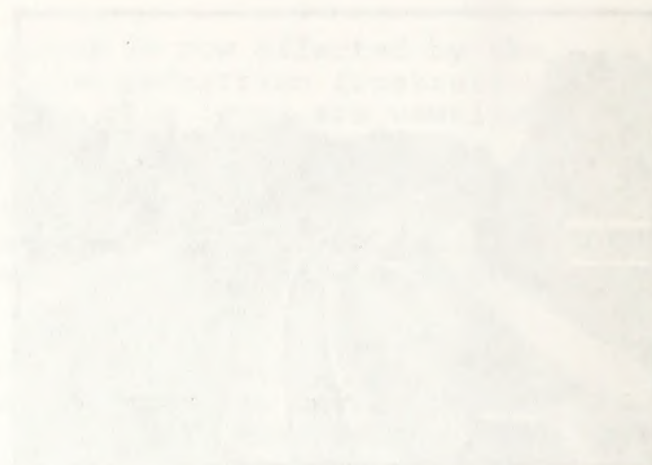


Figure 1. The two photographs show the same scene from different angles. The left photograph is taken from a higher vantage point than the right photograph.

The two photographs show the same scene from different angles. The left photograph is taken from a higher vantage point than the right photograph.



Figure 2. The two photographs show the same scene from different angles. The left photograph is taken from a higher vantage point than the right photograph.



100

100

The North Carolina Department of Transportation conducts traffic counts on a regular basis across the state. These counts are reported in the form of Average Daily Traffic (ADT) volumes. The ADT volumes for the Columbus -Tryon area are shown in Figure 9.

To estimate future travel demand, traffic trends over the past eight years were studied. A comparison of annual growth rates from 1983 to 1991 at various count locations in the Columbus - Tryon planning area shows average annual growth rates ranging from 1.0% to 6.4%. It is very difficult, however, for an area to sustain an annual growth rate over four percent for a long period of time. It is also very unlikely that an area will maintain a growth rate of less than two percent. Traffic projections for the year 2020 are shown in Figure 10.

Traffic Accidents

Traffic accident analysis is an important consideration in the development of a thoroughfare plan. The source of traffic accidents can be broken down into three general categories: the physical environment, the driver, and the physical attributes of the vehicle. The first source includes such things as road conditions, road obstructions, traffic conditions, and the weather. The second source refers to the driver's mental alertness, distractions in the car, ability to handle the car, and reaction time. The third source includes such things as the size of the vehicle, vehicle responsiveness, the condition of the brakes and the tires, and how well the windshield wipers and the defroster work. All traffic accidents can be attributed to one or more of these sources; however, the driver is often the primary source.

Accident data for January, 1990, to September, 1993, was studied as part of the development of this report. The largest single intersection accident site was found to be the interchange of I-26 with NC 108 at Columbus. Recommended improvements to the I-26/US 74 interchange will reduce traffic at the I-26/NC 108 interchange. The removal of this traffic will be a long range solution to the current accident problem. The addition of a turning lane and traffic signal at I-26 and NC 108 should help to reduce the number of accidents at this location in the more immediate future. Four other intersections were also found to have five or more accidents during this time. Refer to Table 6.

After reviewing the accident types at the remaining high accident intersections, the greatest percentage of accidents were found to be rear-end accidents involving a turning movement. These accidents are usually a result of a sight distance problem. The sight distance problems on NC 108 and US 176 can be directly linked to the mountainous terrain of the area. Turning lanes have been recommended in an effort to reduce the number of accidents.

Table 6. Selected Accident Inventory
(January, 1990 - September, 1993)

Location	Number of Accidents
I-26 at NC 108	11
US 176 at NC 108	8
NC 108 at SR 1514	6
NC 108 at SR 1531	6
I-26 at Mill St.	5

00



LEGEND

REALIGNMENT

1991 AVERAGE DAILY TRAFFIC COUNT

1991

	EXISTING	PROPOSED
MAJOR THOROUGHFARE		
FREEWAY		
OTHER		
MINOR THOROUGHFARE		

1991 AVERAGE DAILY TRAFFIC COUNTS FOR COLUMBUS AND TRYON

AUGUST 28, 1995

POLK COUNTY
NORTH CAROLINA

PREPARED BY

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
STATEWIDE PLANNING BRANCH - GIS BRANCH

IN COOPERATION WITH THE

U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION

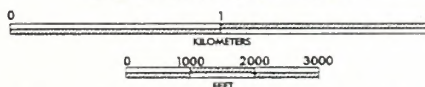


FIGURE 9

Table 6. Selected Accident Inventory
(January, 1990 - September, 1993)

Location	Number of Accidents
I-26 at NC 108	11
US 176 at NC 108	8
NC 108 at SR 1514	6
NC 108 at SR 1531	6
I-26 at Mill St.	5

INSERT
FOLD-OUT
OR MAP
HERE!



.000



LEGEND

REALIGNMENT

2020 AVERAGE DAILY TRAFFIC COUNT

2020

	EXISTING	PROPOSED
MAJOR THOROUGHFARE	—	---
FREEWAY	—	---
OTHER	—	---
MINOR THOROUGHFARE	—	---

2020 AVERAGE DAILY TRAFFIC COUNTS FOR COLUMBUS AND TRYON

AUGUST 28, 1995

POLK COUNTY
NORTH CAROLINA

PREPARED BY

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

STATEWIDE PLANNING BRANCH - GIS BRANCH

IN COOPERATION WITH THE

U.S. DEPARTMENT OF TRANSPORTATION

FEDERAL HIGHWAY ADMINISTRATION

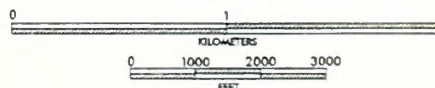


FIGURE 10



INSERT
FOLD-OUT
OR MAP
HERE!



VI. Environmental Concerns

In the past several years, environmental concerns associated with highway construction have become a major part of the planning process. Section 102 of the National Environmental Policy Act requires the execution of an Environmental Impact Statement (EIS) for highway projects that have a significant impact on the environment. Included in an EIS is a project's impact on wetlands, water quality, historic properties, wildlife, and public lands. Although this thoroughfare plan report does not include as much detail as an EIS would, preliminary research was done on several of these factors and is reported below.

Wetlands

Wetlands are lands where saturation with water is the dominant factor in determining the nature of soil development and the types of plant and animal communities living in and on the surface of the soil. They are crucial ecosystems in our environment. Wetlands help regulate and maintain the hydrology of our rivers, lakes, and streams by slowly storing and releasing flood waters. They help maintain the quality of our water by storing nutrients, reducing sediment loads, and reducing erosion. Wetlands are also critical to fish and wildlife populations. They provide an important habitat for about one third of the plant and animal species that are federally listed as threatened or endangered.¹

Section 404 of the Clean Water Act of 1977 requires no disruption of wetlands if there is a practical and feasible alternative that would have a less adverse impact on the area. In addition, compensatory mitigation is required if wetlands are impacted.

Soils mapping published by the Soil Conservation Service of the U. S. Department of Agriculture was used to investigate possible impacts to wetlands in the area. From these sources, it appears that no wetlands will be affected.

Threatened and Endangered Species

A preliminary review of the Federally Listed Threatened and Endangered Species within the Columbus and Tryon planning area was done to determine the effects that widening existing facilities could have on the wildlife. These species were identified using mapping from the North Carolina Department of Environment, Health, and Natural Resources.

¹Dahl, T. E., and C. E. Johnson. Status and Trends of Wetlands in the Conterminous United States. United States Department of Interior, Fish and Wildlife Service, Washington, DC 1991.

The Threatened and Endangered Species Act of 1973 allows the U. S. Fish and Wildlife Service to impose measures on the Department of Transportation to mitigate the environmental impacts of a road project on endangered plants and animals and critical wildlife habitats. By locating rare species in the planning stages, we are able to avoid or minimize these impacts.

Six state listed rare species were found in the Columbus and Tryon Planning Area along the US 176/NC 108 thoroughfare. Possible impacts to these species should be further investigated should the municipalities pursue widening this facility, or should they pursue improving the I-26/US 74/NC 108 interchange. Although other rare species were also found in the Planning Area, no proposed improvements will affect the areas in which they are located.

Historic Sites

The locations of historic sites in the Columbus and Tryon planning area were investigated to determine the possible impacts of the proposed transportation improvements.

The federal government requires all State Departments of Transportation to make special efforts to preserve historic sites. Section 106 of the National Historic Preservation Act requires the Department of Transportation to identify historic properties listed in the National Register of Historic Places and properties eligible to be listed. The DOT must consider the impact of its road projects on these properties and consult with the Federal Advisory Council on Historic Preservation.

In addition to the federal guidelines, the State of North Carolina has issued its own guidelines for the preservation of historic sites. The NC General Statute 121-12(a) requires the DOT to identify historic properties listed on the National Register, but not necessarily those eligible to be listed. DOT must consider the impacts and consult with the North Carolina Historical Commission, but it is not bound by their recommendations.

There are currently seven properties listed on the National Register and seven properties listed on the State Study List in the Columbus and Tryon area.

National Registry

1. Blackberry Hill (Mills House) - located on SR 1516, 0.1 miles north of SR 1501
2. Block House Site - located 0.5 miles east of US 176 on the NC-SC boundary
3. J. G. Hughes House - located on North Peak Street in Columbus
4. Mills-Screven Plantation - located on the south side of SR 1506, opposite SR 1509
5. Pine Crest Inn - located on Pine Crest Lane in Tryon
6. Polk County Courthouse - located on Courthouse Street in Columbus
7. Seven Hearths - located at the junction of US 176 and Harmon Field Road

State Study List

1. Cain-McDonald House - located on Markham Road in Tryon
2. Lanier Library - located 3 miles southwest of Columbus on NC 108
3. Lynncote - located on the east side of NC 108, 0.25 miles southeast of SR 1121
4. Melrose Historic District - located on Melrose Avenue in Tryon
5. St. Luke's Hospital - located off of US 176 in Tryon
6. The Melrose Lodge - located on Melrose Avenue in Tryon
7. The Villa - located on SR 1111, 0.25 miles northwest of SR 1114

Air and Noise Pollution

The design of a thoroughfare system can have a significant effect on the amount of pollutants added to the atmosphere. Pollutant emissions are reduced when traffic is permitted to flow smoothly and by the reduction of congestion and stop-and-go conditions. This reduction of pollutants is created by the more efficient use of fuel offered by free flow conditions.

The control of noise pollution in the vicinity of residential neighborhoods is another important aspect of transportation planning. By designating certain routes as thoroughfares, we are able to direct the heaviest flows of traffic through areas that are amenable to or even desire such traffic. This reduces the noise from automobile and truck traffic in areas where quieter surroundings are desired.

Air and noise pollution levels will increase the most along the major routes, including NC 108 and US 176. Widening these facilities would reduce congestion, therefore reducing pollutant emissions. Not widening NC 108 and US 176 will worsen air pollution in Columbus and Tryon.



APPENDICES



APPENDICES

Appendix A

Municipal and Public Involvement

On March 6, 1991, the Towns of Columbus and Tryon requested thoroughfare planning assistance from the Statewide Planning Branch of the North Carolina Department of Transportation (NCDOT).

On November 3, 1993, a meeting was held with the Polk County Manager, the Columbus Town Manager, the Tryon Town Manager, and the North Carolina Department of Transportation. The thoroughfare planning process and local concerns were discussed. The concerns presented are listed below in random order:

1. Add left turn lanes on NC 108 at I-26 interchange in order to relieve congestion.
2. Improve ramp exit from I-26 to US 74 (existing ramp traffic must cross NC 108).
3. Add left turn lane on NC 108 E at the intersection of NC 108 and Houston Street (SR 1137) to relieve congestion.
4. Widen NC 108 to three lanes through downtown Columbus and change the parking from angle parking to parallel parking to relieve congestion and allow safer parking movements.
5. Add a left turning lane on NC 108 E at Kangaroo to relieve congestion and provide safer turning movements.
6. Add a left turning lane on NC 108 W at Milliken Hatch Plant to relieve congestion and provide safer turning movements.
7. Add a left turning lane on NC 108 W at Industrial Drive (SR 1556) to relieve congestion and provide safer turning movements.
8. Improve conditions and/or warnings approaching Polk High School on NC 108 W.
9. Widen US 176 to three lanes from Carson Street to the South Carolina state line to relieve congestion and to provide safer turning movements.
10. Add a traffic signal at the intersection of Carolina Drive and US 176 to relieve congestion.
11. Change Pacolet Street (SR 1187) from two-way to one-way in conjunction with the Town of Tryon changing Walnut Street from two-way to one-way and the Town of Tryon improving the intersection of McCown Street and Pacolet

Street in relationship to the railroad tracks in order to relieve congestion.

12. Add a new traffic signal at the intersection of Howard Street and US 176 to accommodate the Town of Tryon adding a left turn lane on W. Howard Street.
13. Replace the concrete barrier on the stone bridge at the intersection of NC 108 (Scriven Road) and Lynn Road (SR 1505) with guardrail due to the tightness of the curve.
14. Construct a truck pull-off at the top of the mountain along I-26.

On February 16, 1995, preliminary recommendations were presented to the Polk County Manager, the Polk County Planner (Isothermal), and both Town Managers. Three issues were discussed: whether or not anything could be done to handle increasing traffic along US 176 in Tryon's downtown area; the opposition to closing the Pacolet Street railroad crossing in Tryon; and possible alternatives for improving the I-26/US 74/NC 108 interchange. It was decided that there were no feasible alternatives for US 176 in downtown Tryon, the recommended closing of the Pacolet Street railroad crossing would be deleted, and the feasibility of improving the existing I-26/US 74/NC 108 interchange would be discussed with NCDOT's Roadway Design Branch.

On July 17, 1995, a public hearing was held at the Polk County Courthouse to receive comments on the proposed plan from the public. The Polk County Board of Commissioners, the Columbus Town Council, and representatives from NCDOT attended. Concerns about the recommended widening of NC 108 and improvements to the I-26/US 74/NC 108 interchange were expressed. At the closing of the public hearing, a motion was made to further review the recommendations and to develop a priorities list.

On August 28, 1995, a public hearing was held at the Tryon Town Hall to receive additional comments on the proposed plan from the public. Concerns about the recommended widening of US 176 and the recommendation to change Pacolet Street and Walnut Street to one-way streets were expressed. The Tryon Town Council adopted the plan unanimously with an amendment to remove the one-way streets and an inclusion in the report stating that the local municipality was not interested in the widening of US 176.

As of the writing of this report, neither the Columbus Town Council nor the Polk County Board of Commissioners had adopted the proposed thoroughfare plan. Once a decision concerning these adoptions are made, the Statewide Planning Branch will recommend the locally adopted portions of the plan to the North Carolina Board of Transportation.

The letters and articles written and published in response to the recommendations made in this study and in response to the July 17, 1995, public hearing are shown on the following pages.

KANGAROO PRODUCTS COMPANY

108 MILL SPRING ROAD
P.O. BOX 607
COLUMBUS, NORTH CAROLINA 28722

TELEPHONE (704) 894-8241

FAX (704) 894-2718



May 18, 1995

Mr. Skip Seaman
33 Oleson Drive
Columbus

Dear Skip:

Thank you very much for your request to input suggestions for the meeting Tuesday evening about road priorities in Polk County.

For many years, I have become increasingly concerned about traffic volume on Highway 108, especially in front of Kangaroo's plant east of Columbus.

At this location, we see that the road continues to have plenty of traffic-carrying capacity. The safety problem really comes about because there is no left-hand turn lane.

I am in favor of widening the road sufficiently to permit a middle lane from which left-hand turns may be made.

I'm not in favor of widening Highway 108 to 4 lanes. Everyplace I see undivided 4 lane highways, they're more dangerous than 2-lane roads. People making left-hand turns from undivided 4-lane roads are liable to be hit from behind as they wait to make their turns. This style of road also greatly slows traffic in the left lane, which is ordinarily the faster traffic. *Also, I've observed that people entering 4-lane roads from side roads and driveways find it very difficult to gauge the speed and positions of all oncoming lanes, thus inviting accidents. This is especially true when making left hand turns off side roads on to the 4 lane road.*

I am definitely not in favor of widening Highway 108 to a **divided four lane highway, with a fifth turning lane**. This type of major highway takes up a tremendous amount of land. It is a very expensive project for taxpayers--not only for actual construction but also for the cost of requiring additional right-of-way via Eminent Domain. It destroys the esthetics of the community. And this type of highway is almost as difficult to turn into, from side roads and driveways, as the undivided 4-lane. I've observed throughout North Carolina that this generally leads to a tremendous number of stop lights, in order to permit safe turns from side roads. Thus, in a vicious cycle, the divided 4-lane highway becomes very slow-going for travelers--and eventually ends up being as slow to travel as the original 2-lane road!

BRANCH LOCATION: CARSON CITY, NEVADA

MEMBER NATIONAL GOLF FOUNDATION

I'm sure DOT will argue vigorously about these things, and promise us that 4-lane highways are the only way to take care of growth and increased traffic in the future. I would argue that, today, locals in the know frequently choose to travel Highway 25A (a 2-lane road in Asheville/Arden area), instead of Highway 25, a divided 4-lane which parallels it for many miles. Traffic moves quicker on the 2-lane road with no stoplights than it does on the big road which has stoplights every few blocks.

In both Britain and France, which have much denser populations than here, engineers have discovered that 3-lane roads are the answer. A 3 lane road is cheap, takes up little more land than a 2-lane road, causes less accidents than bigger roads, and keeps traffic moving smoothly.

Sincerely,



Michael McCue

ighfare Plan

pany, and Milliken, Inc. The angle parking along this facility in the downtown area of Columbus should be replaced with parallel parking. (emphasis ours).

Plans for Side Roads

Carolina Drive, in Tryon, Edwards Rd./Houston Rd. in Columbus, Fox Mountain Rd., and Harmon Field Rd., Hogback Mountain Rd., Embury St., Laurel Ave. in Tryon as two lane facilities "should be adequate for traffic throughout the planning period." Other roads that should remain two lane facilities included Old US 19/Hooker Rd., Old Howard Gap Rd., Peak St., Sandy Rd. and Hayes Rd. in Columbus, and Walker St., Peniel Rd., and Houston Rd.

Tryon T-Intersection

McCown St.—...To increase safety and efficiency, the McCown St./US 176 intersection should be improved. In order not to create an additional railroad crossing, New Market Rd., McCown St. and US 176 should be realigned to form a standard "T-intersection" at the crossing of US 176.

Tryon One-Way Streets

Melrose Ave., Chestnut St., Pacolet St., Walnut St. currently connect the Hogback Mountain Rd., Embury, Laurent Ave. radial to US 176.

These facilities are largely commercial. To alleviate peak hour congestion along Pacolet St.,m Pacolet St. and Melrose Ave. from Walnut St. to Chestnut St. and Walnut St. from Chestnut St. from Melrose Ave. to Pacolet St. should serve as one-way pairs.

This will reduce hazard caused by "spill over" onto US 176. To further increase safety, the railroad crossing at Pacolet St. should be closed and the McCown St./US 176 intersection should be improved to provide Pacolet St.

The report covered a dozen or more two lane roadways in the area with no recommendation for change. These included Capps Rd., Chestnut St. Constance St., East Howard St., Vaughn St., Lockhart Rd., Embury St., Markham Rd., Shepherd St., Peake St., Melrose Ave. and Braewick Rd., Park St. School St., and others.

I'm sure DOT will argue vigorously about these things, and promise us that 4-lane highways are the only way to take care of growth and increased traffic in the future. I would argue that, today, locals in the know frequently choose to travel Highway 25A (a 2-lane road in Asheville/Arden area), instead of Highway 25, a divided 4-lane which parallels it for many miles. Traffic moves quicker on the 2-lane road with no stoplights than it does on the big road which has stoplights every few blocks.

In both Britain and France, which have much denser populations than here, engineers have discovered that 3-lane roads are the answer. A 3 lane road is cheap, takes up little more land than a 2-lane road, causes less accidents than bigger roads, and keeps traffic moving smoothly.

Sincerely,



Michael McCue

INSERT
FOLD-OUT
OR MAP
HERE!

June 30, 1995

Mr. Lane Bailey, County Manager
Polk County Court House
P. O. Box 308
Columbus NC 28722

Re: Recommended Thoroughfare Plan

Dear Mr. Bailey:

In response to the proposed widening of 108 and 176 a committee was formed to review the proposals. After deliberation the following conclusions were reached.

1. The bridge over I-26 should be widened, in all likelihood to four lanes considering the cost of the project. In addition, the installation of a signal light would help ease traffic flow.
2. There should be planning for direct access to 74 from I-26 West, as well as from 74 to I-26 East.
3. There is a unanimous opposition to the widening of 108 or 176 to either 4-lane or 3-lane highways.
4. If necessary to alleviate traffic congestion, turning lanes might be considered at the following locations:
 - a) New Remax location opposite Edwards Cleaners on 108.
 - b) St. Luke's Hospital.
 - c) Isothermal Community College.
 - d) The Kangaroo plant (see letter from Mike McCue attached).
4. There should be some determination as to the adequacy of the present configuration at Shuford Drive in view of the several restaurants in the process of being built there. A longer turning lane might be considered.
5. The installation of a flashing signal light at rush hour might be considered at Polk County High School.

The above recommendations, specifically the opposition to the widening of 108 or 176, were agreed upon to prevent major changes in traffic patterns, such as the use of a wider 108 by flow-through, fast-moving traffic to get to 74.

We would like to establish a "Sense of Place" in our peaceful, rural county and to maintain our small town heritage. A two-lane road with slow moving traffic and some beautification projects and streetscape enhancements would induce drivers to stop and shop with our downtown Columbus merchants. This was also the conclusion of the North Carolina Downtown Development Association (NCDDA) when they conducted their study of Polk County, and we quote from their March 20, 1995 Technical Assistance Team Report:

"Maintain integrity of Highway 108. In the opinion of the Technical Assistance Team, the quickest way to destroy the quaintness of the town would be to four-lane Hwy 108. Almost certainly, the town parking through the downtown area along Hwy 108 would have to be removed to accommodate a four-lane facility. Also, a four-lane road would attract thru-traffic and destroy the character of downtown. Widening Hwy 108 is not needed because it is paralleled by U.S. 74. Major improvements need to be made at the interchange of Interstate 26, U.S. 74 and Hwy 108. This improvement should be moved up on the Transportation Improvement Plan (TIP), and the four-laning of Hwy 108 should be removed completely from the TIP."

We concur with this conclusion and feel that it applies to 176 in Tryon as well in that the rural character of the town should be maintained. There also, fast-moving through traffic would not only destroy the quaintness of the town but also make it more difficult to stop and shop with downtown merchants. As an aside, we feel that the rural character of all the small towns in the Polk County area should be protected as it is an important part of our unique heritage.

We very much appreciate your consideration of our conclusions, and hope you will present them to the county commissioners for their review.

Sincerely,

Kathy Pack

Kathy Pack
Columbus Merchants Association

Suzanne Martin

Suzanne Martin, President
Pacolet Area Conservancy

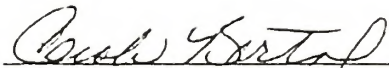
David Lane

David Lane
Columbus Town Manager

Marion Faurey
Marion Faurey, President
Polk County Chamber of
Commerce



Carl Rosenblad, Chairman
Polk County Beautification
and Appearance Commission



Carol Bartol, Director
Isothermal Community
College - Polk Campus



Jennifer Thompson, President
Tryon Business and
Beautification Association

cc: David Draughn - Tryon Town Manager

Enclosed for you are two copies of a letterhead memorandum (LHM) dated and captioned as above. The LHM is being furnished to you for your information and for your use in the event you are requested to provide information regarding the same. The LHM is being furnished to you for your information and for your use in the event you are requested to provide information regarding the same.

The LHM is being furnished to you for your information and for your use in the event you are requested to provide information regarding the same. The LHM is being furnished to you for your information and for your use in the event you are requested to provide information regarding the same.

The LHM is being furnished to you for your information and for your use in the event you are requested to provide information regarding the same. The LHM is being furnished to you for your information and for your use in the event you are requested to provide information regarding the same.

We very much appreciate your cooperation and assistance in this matter and hope you will present these to the appropriate authorities.

Sincerely,


[Name]
[Title]


[Name]
[Title]


[Name]
[Title]


[Name]
[Title]

Tryon Daily Bulletin, Wednesday, July 19, 1995

Tryon Looks At DOT Plans For One-Way Streets, Widening 108

No Tryon Town Council members spoke up Monday night in favor of four-laning Highway 108 through Columbus and Tryon, as suggested by a N.C. Department of Transportation's (NCDOT) Thoroughfare Plan.

"The county is holding a public hearing right now and I think they're recommending against it," said mayor Ellis Fincher. "I think they should just make 108 wider from Tryon to Columbus."

"We don't want four lanes to Columbus," Tryon resident Bill Crowell called out. "Three lanes," replied Fincher, explaining that this would provide turning lanes for Howard Street near town hall and at the entrance to St. Luke's Hospital.

"I think we just need to widen 108 and improve the shoulders," said town manager David Draughn.

"Highway 108 needs help at I-26," said councilman Mike O'Steen. "This map shows not being able to get off 74 and go to Tryon," he added. "It puts you right back on I-26. We'll have to change that."

Draughn also illustrated on a blackboard the DOT's plan to create a series of one-way streets running counter-clockwise around the Tryon Post Office. No votes were taken on the plan since it is still in the discussion stage, with a public hearing scheduled just prior to the town's regular monthly meeting on August 21. A representative of the NCDOT will be in attendance to answer questions, said Draughn.

— Reen Smith

Tyons Looks At DOT Plans For One-Way Street Widening 102

Mr. Tyon, Town Council member representing the town of Tyon, is one of four town members on the town of Tyon, N.C. DOT, through Columbia and Tyon, as suggested by a N.C. Department of Transportation (DOT) Transportation Plan.

"The county is holding a public hearing right now and I don't know if it's convenient to go to it," said Mayor Bill Crockett. "I don't know if it's convenient to go to it."

"We don't want to go to it," said Crockett. "I don't know if it's convenient to go to it."

"I don't know if it's convenient to go to it," said Crockett. "I don't know if it's convenient to go to it."

"I don't know if it's convenient to go to it," said Crockett. "I don't know if it's convenient to go to it."

"I don't know if it's convenient to go to it," said Crockett. "I don't know if it's convenient to go to it."

"I don't know if it's convenient to go to it," said Crockett. "I don't know if it's convenient to go to it."

—Don Davis

Appendix B

Thoroughfare Plan Street Tabulations and Recommendations

SECTION	-----PRESENT-----					-----FUTURE-----				
	DIST (km)	RDWY (m)	ROW (m)	CAP (VPD)	1991 ADT	CAP (VPD)	2020 ADT	RDWY XSEC	ROW (m)	
I-26										
WPAB - NC 108	2.91	14.4	85	54000	15700	ADQ	40200	ADQ	ADQ	
NC 108 - EPAB	2.71	14.4	79	54000	16900	ADQ	43300	ADQ	ADQ	
US 74										
I-26 - NC 108	2.63	14.4	70	54000	6500	ADQ	22300	ADQ	ADQ	
NC 108 - NPAB	1.47	14.4	70	54000	NA	ADQ	20000	ADQ	ADQ	
US 176 (S. Trade St.)										
SPAB - Carolina Dr.	1.15	7.2	18	12000	7400	22000	13300	G*	21	
Carolina - New Market	.55	7.2	18	12000	7900	22000	14300	G*	21	
New Market Rd. - NC 108	.91	7.2	18	12000	9000	22000	16300	G*	21	
US 176										
NC 108 - Harmon Field	1.51	7.2	18	12000	2400	ADQ	4300	ADQ	ADQ	
Harmon Field Rd. - WPAB	.77	7.2	18	12000	2700	ADQ	4900	ADQ	ADQ	
NC 108										
US 176 - Scriven Rd.	.65	7.2	18	12000	6900	22000	15700	G*	21	
Scriven - Harmon Field	.98	7.2	18	12000	6700	22000	15300	G*	21	
Harmon Field - Capps Rd	.84	7.2	18	12000	8000	22000	18300	G*	21	
Capps Rd. - Old US 19	1.23	7.2	18	12000	7800	22000	17800	G*	21	
Old US 19 - I-26	2.25	7.2	18	12000	8100	22000	18500	C*	27	
I-26 - Walker St.	.82	7.2	18	12000	13000	28000	26400	C*	27	
Walker St. - Peak St.	.28	14.4	18	18000	8600	22000	19600	G*	21	
Peak St. - US 74	1.70	7.2	18	12000	NA	22000	14100	G*	21	
US 74 - NPAB	1.42	7.2	30	12000	5700	22000	13000	G*	ADQ	
Braewick Rd.										
Forrest Ln. - Carolina	.65	7.2	18	12000	250	ADQ	500	ADQ	ADQ	
<div style="display: flex; justify-content: space-between;"> <div> DIST - Distance RDWY - Roadway ROW - Right-of-way CAP - Capacity at LOS D ADT - Average Daily Traffic XSEC - Cross-section VPD - Vehicles per day </div> <div> ADQ - Adequate CAP - Capacity at Level of Service D NA - Not available NPAB - Northern Planning Area Boundary SPAB - Southern Planning Area Boundary EPAB - Eastern Planning Area Boundary WPAB - Western Planning Area Boundary </div> </div>										
1 meter (m) = 3.28 feet 1 kilometer (km) = 0.62 miles										

* The local municipalities are against widening US 176 and NC 108. Refer to the written recommendations in Chapter II.

SECTION	-----PRESENT-----					-----FUTURE-----				
	DIST (km)	RDWY (m)	ROW (m)	CAP (VPD)	1991 ADT	CAP (VPD)	2020 ADT	RDWY XSEC	ROW (m)	
Capps Rd. (SR 1543)										
NC 108 - Gunning Rd.	.69	7.2	18	12000	300	ADQ	600	ADQ	ADQ	
Gunning Rd. - Hooker Rd	1.15	7.2	18	12000	NA	ADQ	600	ADQ	ADQ	
Carolina Dr. (SR 1116)										
WPAB - Overlook Dr.	1.89	7.2	18	12000	300	ADQ	600	ADQ	ADQ	
Overlook -Hillswick Rd.	.83	7.2	18	12000	1000	ADQ	2000	ADQ	ADQ	
Hillswick - S. Trade St	1.31	7.2	18	12000	3000	ADQ	6100	ADQ	ADQ	
Chestnut St.										
Pacolet St. - Melrose	.16	7.2	18	12000	NA	ADQ	3000	ADQ	ADQ	
Melrose Ave. - US 176	.39	7.2	18	12000	NA	ADQ	1500	ADQ	ADQ	
Collinsville Rd. (SR1521)										
EPAB - Houston Rd.	.76	7.2	NA	12000	100	ADQ	200	ADQ	ADQ	
Constance St.										
Walker St. - Peak St.	.30	7.2	NA	12000	150	ADQ	300	ADQ	ADQ	
Edward's Rd. (SR 1137)										
Houston Rd. - NPAB	2.13	7.2	NA	12000	250	ADQ	400	ADQ	ADQ	
Embury Rd.										
Lockhart Rd. - Laurel	.17	7.2	NA	12000	300	ADQ	600	ADQ	ADQ	
Fox Mountain Rd (SR 1531)										
NC 108 - NPAB	1.70	7.2	30	12000	550	ADQ	1000	ADQ	ADQ	
Gunning Rd. (SR 1511)										
Scriven Rd. - Capps Rd.	1.55	7.2	18	12000	100	ADQ	200	ADQ	ADQ	
Harmon Field Rd (SR 1121)										
US 176 - NC 108	1.26	7.2	30	12000	1600	ADQ	3200	ADQ	ADQ	
Hayes Rd. (SR 1534)										
Park St. - EPAB	1.89	7.2	18	12000	NA	ADQ	1200	ADQ	ADQ	
Hogback Mtn. Rd. (SR1115)										
Carolina - Embury Rd.	1.77	7.2	18	12000	300	ADQ	600	ADQ	ADQ	
Hooker Rd. (SR 1515)										
Old US 19 - Capps Rd.	.79	7.2	18	12000	NA	ADQ	400	ADQ	ADQ	
Capps Rd. - EPAB	.79	7.2	18	12000	NA	ADQ	500	ADQ	ADQ	
1 meter (m) = 3.28 feet 1 kilometer (km) = 0.62 miles										

SECTION	-----PRESENT-----					-----FUTURE-----			
	DIST (km)	RDWY (m)	ROW (m)	CAP (VPD)	1991 ADT	CAP (VPD)	2020 ADT	RDWY XSEC	ROW (m)
Houston Rd.									
Edward's Rd. - Skyuka	.95	7.2	18	12000	NA	ADQ	2500	ADQ	ADQ
Skyuka Rd. - NC 108	.93	7.2	18	12000	1600	ADQ	3200	ADQ	ADQ
Peniel Rd. - EPAB	2.08	7.2	18	12000	2100	ADQ	4200	ADQ	ADQ
E. Howard St.									
US 176 - Peake St.	1.15	7.2	18	12000	NA	ADQ	500	ADQ	ADQ
Peake St. - Vaughn St.	.52	7.2	18	12000	NA	ADQ	500	ADQ	ADQ
W. Howard St.									
School St. - US 176	.38	6.0	18	9000	450	14000	900	H	ADQ
Howard Gap Rd. (SR 1128)									
Old Howard Gap Rd. - NC 108	.99	7.2	NA	12000	650	ADQ	1300	ADQ	ADQ
Laurel Ave.									
Doubleday Rd. - Melrose	.43	7.2	18	12000	800	ADQ	1600	ADQ	ADQ
Lockhart Rd.									
Embury St. - W. Howard	.54	7.2	18	12000	500	ADQ	1000	ADQ	ADQ
Marham Rd.									
Scriven Rd. - Shepherd	.84	7.2	18	12000	NA	ADQ	400	ADQ	ADQ
Melrose Ave.									
Braewick Rd. - Laurel	.32	7.2	18	12000	NA	ADQ	2000	ADQ	ADQ
Laurel Ave. - Walnut St	.28	7.2	18	12000	NA	ADQ	3000	ADQ	ADQ
Walnut St. - Chestnut	.16	7.2	18	12000	1850	ADQ	3700	ADQ	ADQ
New Market Rd. (SR 1502)									
Ridge Rd. - S. Trade St	3.44	7.2	NA	12000	300	ADQ	600	ADQ	ADQ
Old Howard Gap Rd. SR1122									
WPAB - Howard Gap Rd.	.52	7.2	30	12000	300	ADQ	600	ADQ	ADQ
Old US 19 (SR 1514)									
NC 108 - Hooker Rd.	.58	7.2	18	12000	500	ADQ	1000	ADQ	ADQ
Hooker Rd. - NC 108	2.79	7.2	18	12000	100	ADQ	200	ADQ	ADQ
Pacolet St.									
Walnut St. - US 176	.27	7.2	18	12000	2200	14000	4500	ADQ	ADQ
Park St.									
NC 108 - Hayes Rd.	1.07	7.2	18	12000	100	ADQ	200	ADQ	ADQ
1 meter (m) = 3.28 feet 1 kilometer (km) = 0.62 miles									

SECTION	-----PRESENT-----					-----FUTURE-----				
	DIST (km)	RDWY (m)	ROW (m)	CAP (VPD)	1991 ADT	CAP (VPD)	2020 ADT	RDWY XSEC	ROW (m)	
Peak St.										
NC 108 - Simms St.	.30	7.2	30	12000	2300	ADQ	4700	ADQ	ADQ	
Simms St. - Constance	.35	7.2	NA	12000	1500	ADQ	3100	ADQ	ADQ	
Peake St.										
Shepherd - E. Howard	.24	7.2	18	12000	NA	ADQ	200	ADQ	ADQ	
Peniel Rd. (SR 1137)										
Denton St. - Houston Rd	.43	7.2	NA	12000	2000	ADQ	4100	ADQ	ADQ	
Ridge Rd. (SR 1501)										
SPAB - New Market Rd.	1.09	7.2	18	12000	300	ADQ	600	ADQ	ADQ	
Sandy Rd. (SR 1534)										
Constance Rd. - Park St	.47	7.2	60	12000	600	ADQ	1200	ADQ	ADQ	
School St.										
W. Howard St. - US 176	.28	7.2	18	12000	800	ADQ	1600	ADQ	ADQ	
Scriven Rd. (SR 1506)										
NC 108 - Gunning Rd.	1.97	7.2	18	12000	200	ADQ	400	ADQ	ADQ	
Shepherd St.										
Marham Rd. - Peake St.	.44	7.2	18	12000	NA	ADQ	400	ADQ	ADQ	
Simms St.										
Walker St. - Peak St.	.28	7.2	18	12000	300	ADQ	600	ADQ	ADQ	
Skyuka Rd. (SR 1135)										
NC 108 - Houston Rd.	5.69	7.2	30	12000	750	ADQ	1500	ADQ	ADQ	
Vaughn St.										
New Market - E. Howard	.13	7.2	18	12000	NA	ADQ	400	ADQ	ADQ	
Walker Rd. (SR 1533)										
Fox Mtn. Rd. - Hayes Rd	1.02	7.2	18	12000	100	ADQ	200	ADQ	ADQ	
Walker St.										
NC 108 - Peniel St.	.32	7.2	NA	12000	3000	ADQ	6100	ADQ	ADQ	
Peniel - Constance St.	.33	7.2	NA	12000	NA	ADQ	300	ADQ	ADQ	
Walnut St.										
Pacolet St. - Melrose	.16	7.2	18	12000	NA	14000	4500	ADQ	ADQ	
1 meter (m) = 3.28 feet 1 kilometer (km) = 0.62 miles										

SECTION	-----PRESENT-----					-----FUTURE-----			
	DIST (km)	RDWY (m)	ROW (m)	CAP (VPD)	1991 ADT	CAP (VPD)	2020 ADT	RDWY XSEC	ROW (m)
Warrior Dr. (SR 1125)									
US 176 - Meadow Lark Dr	1.07	7.2	NA	12000	900	ADQ	1800	ADQ	ADQ
Meadow Lark Dr. - Howard Gap Rd.	2.59	7.2	NA	12000	350	ADQ	700	ADQ	ADQ
1 meter (m) = 3.28 feet 1 kilometer (km) = 0.62 miles									

Appendix C

Typical Thoroughfare Cross Sections

Cross section requirements for thoroughfares vary according to the desired capacity and level of service to be provided. Universal standards in the design of thoroughfares are not practical. Each street section must be individually analyzed and its cross section requirements determined on the basis of amount and type of projected traffic, existing capacity, desired level of service, and available right-of-way.

Typical cross section recommendations are shown in Figure 11. These cross sections are typical for facilities on new location and where right-of-way constraints are not critical. For widening projects and urban projects with limited right-of-way, special cross sections should be developed that meet the needs of the project.

Recommended typical cross sections for thoroughfares were derived on the basis of projected traffic, existing capacities, desirable levels of service, and available right-of-way. The recommended typical cross sections for the thoroughfares are given in Appendix B along with other pertinent information.

Cross sections "A" and "L" is typical for controlled access freeways. The 14 m (46 ft) grassed median is the minimum desirable median width, but there could be some variation from this depending upon design considerations. Right-of-way requirements would typically vary upward from 70 m (228 ft) depending upon cut and fill requirements.

Cross section "B", seven lane curb and gutter, should not be used for new projects. When the conditions warrant six lanes, cross section "D" should be recommended. Cross section "B" should be used only in special situations such as when widening from a five lane section and right-of-way is limited. Even in these situations, consideration should be given to converting the center turn lane to a median so that cross section "D" is the final cross section.

Cross section "C", five lane curb and gutter, is typical for major thoroughfares where frequent left turns are anticipated as a result of abutting development or frequent street intersections.

Cross sections "D", "E", and "M" are used on major thoroughfares where left turns and intersecting streets are not as frequent. Left turns would be restricted to a few selected intersections. The 4.9 m (16 ft) median is the minimum recommended for an urban boulevard type cross section. In most instances, monolithic construction should be utilized due to greater cost effectiveness, ease and speed of placement, and reduced future maintenance requirements. In special cases,

grassed or landscaped medians may be used in urban areas. However, these types of medians result in greatly increased maintenance costs and an increased danger to maintenance personnel. Non-monolithic medians should only be recommended when the above concerns are addressed.

Cross section "F" is recommended for urban boulevards or parkways to enhance the urban environment and to improve the compatibility of major thoroughfares with residential areas. A minimum median width of 7.3 m (24 ft) is recommended with 9.1 m (30 ft) being desirable.

Cross section "G" is recommended for major thoroughfares where projected travel indicates a need for four travel lanes but traffic is not excessively high, left turning movements are light, and right-of-way is restricted. An additional left turn lane would probably be required at major intersections. This cross section should be used only if the above criteria is met. If right-of-way is not restricted, future strip development could take place and the inner lanes could become de facto left turn lanes.

In urban environments, thoroughfares which have high volumes of left turning traffic and provide access to adjacent development typically require **cross section "H"**. Thoroughfares which are proposed to function as one-way traffic carriers would also typically require **cross-section "H"**. **Cross sections "I" and "J"** are usually recommended for urban minor thoroughfares since these facilities usually serve both land service and traffic service functions. **Cross section "I"** would be used on those minor thoroughfares where parking on both sides is needed as a result of more intense development.

Cross section "K" is used in rural areas or for staged construction of a wider multi-lane cross section. On some thoroughfares, projected traffic volumes may indicate that two travel lanes will adequately serve travel for a considerable period of time. For areas that are growing and future widening will be necessary, the full right-of-way of 30 m (100 ft) should be required. In some instances, local ordinances may not allow the full 30 m (100 ft). In those cases, 21 m (70 ft) should be preserved with the understanding that the full 30 m (100 ft) will be preserved by use of building setbacks and future street line ordinances.

The urban curb and gutter cross sections all illustrate the sidewalk adjacent to the curb with a buffer or utility strip between the sidewalk and the minimum right-of-way line. This permits adequate setback for utility poles. If it is desired to provide additional separation for pedestrians or for aesthetic reasons, additional right-of-way must be provided to insure adequate setback for utility poles.

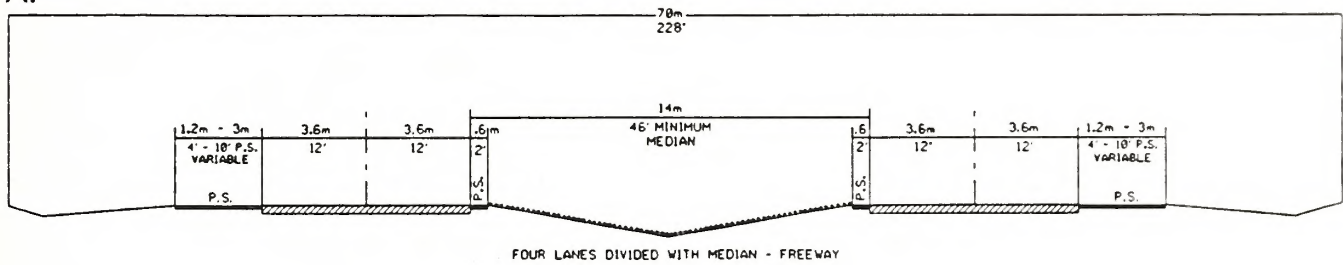
The right-of-ways shown for the typical cross sections are the minimum rights-of-way required to contain the street,

sidewalks, utilities, and drainage facilities. Cut and fill requirements may require either additional right-of-way or construction easements. Obtaining construction easements is becoming the more common practice for urban thoroughfare construction.

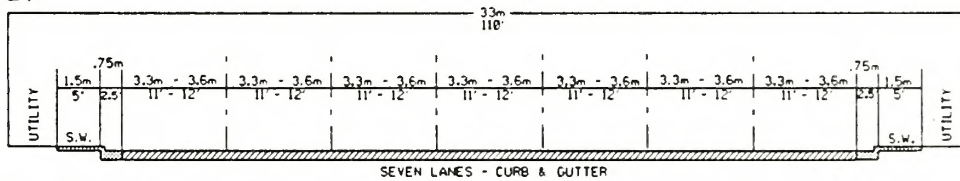
If there is sufficient bicycle travel along the thoroughfare to justify a bicycle lane or bikeway, additional right-of-way may be required to contain the bicycle facilities. The North Carolina Bicycle Facilities Planning and Design Guidelines should be consulted for design standards for bicycle facilities. **Cross sections N, O, and P** are typically used to accommodate bicycle travel.

TYPICAL THOROUGHFARE CROSS SECTIONS

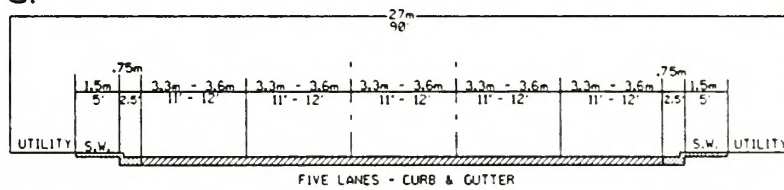
A.



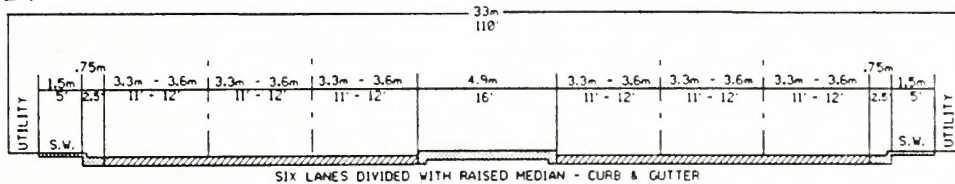
B.



C.

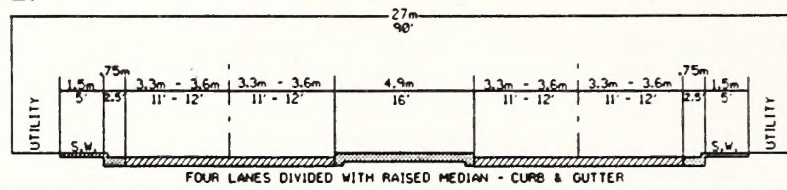


D.

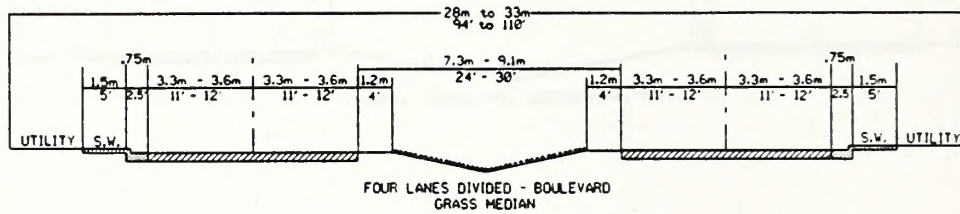


TYPICAL THOROUGHFARE CROSS SECTIONS

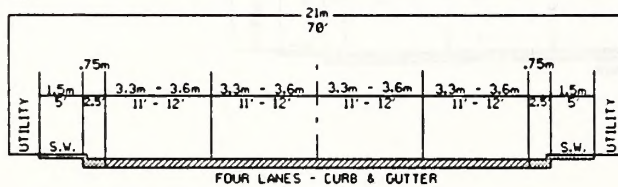
E.



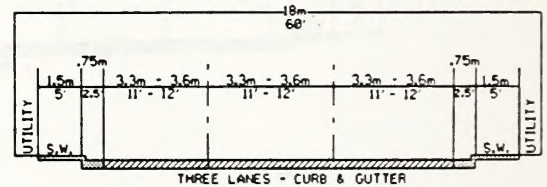
F.



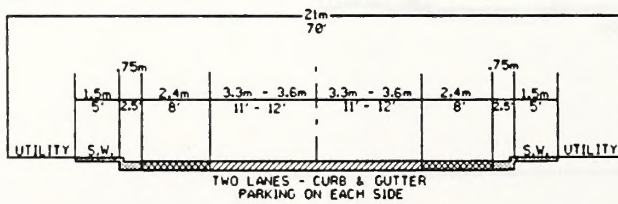
G.



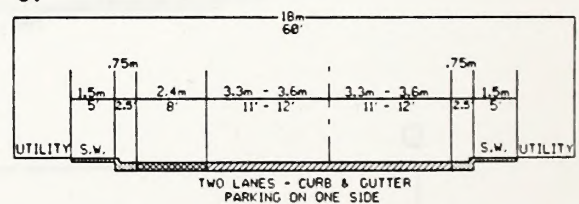
H.



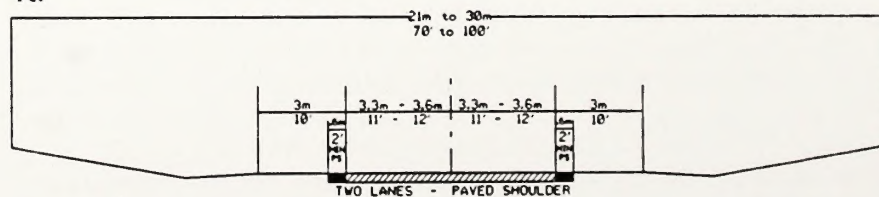
I.



J.



K.



Appendix D

Recommended Subdivision Ordinances

Definitions

I. Streets and Roads:

A. Rural Roads

1. Principal Arterial - A rural link in a highway system serving travel, and having characteristics indicative of substantial statewide or interstate travel and existing solely to serve traffic. This network would consist of Interstate routes and other routes designated as principal arterials.
2. Minor Arterial - A rural roadway joining cities and larger towns and providing intra-state and inter-county service at relatively high overall travel speeds with minimum interference to through movement.
3. Major Collector - A road which serves major intra-county travel corridors and traffic generators and provides access to the Arterial system.
4. Minor Collector - A road which provides service to small local communities and traffic generators and provides access to the Major Collector system.
5. Local Road - A road which serves primarily to provide access to adjacent land, over relatively short distances.

B. Urban Streets

1. Major Thoroughfares - Major thoroughfares consist of Interstate, other freeway, expressway, or parkway roads, and major streets that provide for the expeditious movement of high volumes of traffic within and through urban areas.
2. Minor Thoroughfares - Minor thoroughfares perform the function of collecting traffic from local access streets and carrying it to the major thoroughfare system. Minor thoroughfares may be used to supplement the major thoroughfare system by facilitating minor through-traffic movements and may also serve abutting property.
3. Local Street - A local street is any street not on a higher order urban system and serves primarily to provide direct access to abutting land.

C. Specific Type Rural or Urban Streets

1. Freeway, expressway, or parkway - Divided multilane roadways designed to carry large volumes of traffic at high speeds. A freeway provides for continuous flow of vehicles with no direct access to abutting property and with access to selected crossroads only by way of interchanges. An expressway is a facility with full or partial control of access and generally with grade separations at major intersections. A parkway is for non-commercial traffic, with full or partial control of access.
2. Residential Collector Street - A local street which serves as a connector street between local residential streets and the thoroughfare system. Residential collector streets typically collect traffic from 100 to 400 dwelling units.
3. Local Residential Street - Cul-de-sacs, loop streets less than 750 meters in length, or streets less than one and a half kilometers in length that do not connect thoroughfares, or serve major traffic generators, and do not collect traffic from more than 100 dwelling units.
4. Cul-de-sac - A short street having only one end open to traffic and the other end being permanently terminated and a vehicular turn-around provided.
5. Frontage Road - A road that is parallel to a partial or full access controlled facility and provides access to adjacent land.
6. Alley - A strip of land, owned publicly or privately, set aside primarily for vehicular service access to the back side of properties otherwise abutting on a street.

II. Property

- A. Building Setback Line - A line parallel to the street in front of which no structure shall be erected.
- B. Easement - A grant by the property owner for use by the public, a corporation, or person(s), of a strip of land for a specific purpose.
- C. Lot - A portion of a subdivision, or any other parcel of land, which is intended as a unit for transfer of ownership or for development or both. The word "lot" includes the words "plat" and "parcel".

III. Subdivision

- A. Subdivider - Any person, firm, corporation or official agent thereof, who subdivides or develops any land deemed to be a subdivision.
- B. Subdivision - All divisions of a tract or parcel of land into two or more lots, building sites, or other divisions for the purpose, immediate or future, of sale or building development and all divisions of land involving the dedication of a new street or change in existing streets; provided, however, that the following shall not be included within this definition nor subject to these regulations: (1) the combination or re-combination of portions of previously platted lots where the total number of lots is not increased and the resultant lots are equal to or exceed the standards contained herein; (2) the division of land into parcels greater than ten acres where no street right-of-way dedication is involved, (3) the public acquisition, by purchase, of strips of land for the widening or the opening of streets; (4) the division of a tract in single ownership whose entire area is no greater than two acres into not more than three lots, where no street right-of-way dedication is involved and where the resultant lots are equal to or exceed the standards contained herein.
- C. Dedication - A gift, by the owner, of his property to another party without any consideration being given for the transfer. The dedication is made by written instrument and is completed with an acceptance.
- D. Reservation - Reservation of land does not involve any transfer of property rights. It constitutes an obligation to keep property free from development for a stated period of time.

Design Standards

I. Streets and Roads

The design of all roads within the Planning Area shall be in accordance with the accepted policies of the North Carolina Department of Transportation, Division of Highways, as taken or modified from the American Association of State Highway Officials' (AASHTO) manuals.

The provision of street rights-of-way shall conform and meet the recommendations of the Thoroughfare Plan, as adopted by the municipality.

The proposed street layout shall be coordinated with the existing street system of the surrounding area. Normally the proposed streets should be the extension of existing streets if possible.

- A. Right-of-way Widths - Right-of-way (ROW) widths shall not be less than the following and shall apply except in those cases where ROW requirements have been specifically set out in the Thoroughfare Plan.

1. Rural	Min. ROW
a. Principle Arterial	
Freeways	105 meters
Other	60 meters
b. Minor Arterial	30 meters
c. Major Collector	30 meters
d. Minor Collector	24 meters
e. Local Road	18 meters ¹
2. Urban	
a. Major Thoroughfare other than Freeway and Expressway	27 meters
b. Minor Thoroughfare	21 meters
c. Local Street	18 meters ¹
d. Cul-de-sac	Variable ²

The subdivider will only be required to dedicate a maximum of 30 meters of right-of-way. In cases where over 30 meters of right-of-way is desired, the subdivider will be required only to reserve the amount in excess of 30 meters. On all cases in which right-of-way is sought for a fully controlled access facility, the subdivider will only be required to make a reservation. It is strongly recommended that subdivisions provide access to properties from internal streets, and that direct property access to major thoroughfares, principle and minor arterials, and major collectors be avoided. Direct property access to minor thoroughfares is also undesirable.

A partial width right-of-way, not less than eighteen meters in width, may be dedicated when adjoining undeveloped property that is owned or controlled by the subdivider; provided that the width of a partial dedication be such as to permit the installation of such facilities as may be necessary to serve abutting lots. When the said adjoining property is sub-divided, the remainder of the full required right-of-way shall be dedicated.

¹ The desirable minimum right-of-way (ROW) is 18 meters. If curb and gutter is provided, 15 meters of ROW is adequate on local residential streets.

² The ROW dimension will depend on radius used for vehicular turn around. Distance from edge of pavement of turn around to ROW should not be less than distance from edge of pavement to ROW on street approaching turn around.

- B. Street Widths - Widths for street and road classifications other than local shall be as recommended by the Thoroughfare Plan. Width of local roads and streets shall be as follows:
1. Local Residential
 - Curb and Gutter section: 7.8 meters, face to face of curb
 - Shoulder section: 6 meters to edge of pavement, 1.2 meters for shoulders
 2. Residential Collector
 - Curb and Gutter section: 10.2 meters, face to face of curb
 - Shoulder section: 6 meters to edge of pavement, 1.8 meters for shoulders
- C. Geometric Characteristics - The standards outlined below shall apply to all subdivision streets proposed for addition to the State Highway System or Municipal Street System. In cases where a subdivision is sought adjacent to a proposed thoroughfare corridor, the requirements of dedication and reservation discussed under Right-of-Way shall apply.
1. Design Speed - The design speed for a roadway should be a minimum of 10 km/h greater than the posted speed limit. The design speeds for subdivision type streets shall be:

DESIGN SPEEDS			
Facility Type	<u>Design Speed km/h</u>		
	Desirable	Minimum Level	Minimum Rolling
RURAL			
Minor Collector Roads	100	80	70
Local roads including Residential Collectors and Local Residential	80	80	70
URBAN			
Major Thoroughfares other than Freeway or Expressway	100	80	80
Minor Thoroughfares	100	80	70
Local Streets	70	70	50

2. Maximum and Minimum Grades

a. The maximum grades in percent shall be:

MAXIMUM VERTICAL GRADE				
Facility Type	Design Speed (km/h)	Maximum Grade (Percent)		
		Flat	Rolling	Mountainous
RURAL				
Minor Collector Roads*	30	7	10	12
	50	7	9	10
	60	7	8	10
	90	6	7	9
	100	5	6	8
	110	4	5	6
Local roads including Residential Collectors and Local Residential Streets*	30	-	11	16
	50	7	10	14
	60	7	9	12
	90	6	8	10
	100	5	6	-
URBAN				
Major Thoroughfares other than Freeway or Expressway	50	8	9	11
	60	7	8	10
	90	6	7	9
	100	5	6	8
Minor Thoroughfares*	30	9	10	12
	50	9	9	10
	60	9	8	10
	90	7	7	9
	100	6	6	8
	110	5	5	6
Local Streets*	30	-	12	17
	50	8	11	15
	60	8	10	13
	90	7	9	11
	100	6	7	-

b. Minimum grade should not be less than 0.5% .

c. Grades for 30 meters each way from intersections (measured from edge of pavement) should not exceed 5%.

* For streets and roads with projected annual average daily traffic less than 250 or short grades less than 150 meters long, grades may be 2% more than the values in the above table.

3. Minimum Sight Distance - In the interest of public safety, no less than the minimum sight distance applicable shall be provided. Vertical curves that connect each change in grade shall be provided and calculated using the following parameters:

SIGHT DISTANCE					
Design Speed (km/h)	30	50	60	90	100
Stopping Sight Distance					
Minimum (meters)	30	60	80	140	160
Desirable Minimum (meters)	30	70	90	170	210
Minimum K* Value for:					
Crest curve	3	10	18	71	105
Sag curve	4	12	18	40	51

(General practice calls for vertical curves to be multiples of 10 meters. Calculated lengths shall be rounded up in each case.)

4. The "Superelevation Table" shown below and continued on the next page shows the minimum radius and the related maximum superelevation for design speeds. The maximum rate of roadway superelevation (e) for rural roads with no curb and gutter is 0.08. The maximum rate of superelevation for urban streets with curb and gutter is 0.06, with 0.04 being desirable.

SUPERELEVATION TABLE		
Design Speed (km/h)	Maximum e	Minimum Radius (meters)
50	0.04	100
60	0.04	150
90	0.04	375
100	0.04	490

* K is a coefficient by which the algebraic difference in grade may be multiplied to determine the length in meters of the vertical curve which will provide the desired sight distance. Sight distance provided for stopped vehicles at intersections should be in accordance with "A Policy on Geometric Design of Highways and Streets, 1990".

SUPERELEVATION TABLE continued		
Design Speed (km/h)	Maximum e	Minimum Radius (meters)
50	0.06	90
60	0.06	135
90	0.06	335
100	0.06	435
50	0.08	80
60	0.08	125
90	0.08	305
100	0.08	395

e = rate of roadway superelevation, meter per meter

D. Intersections

1. Streets shall be laid out so as to intersect as nearly as possible at right angles, and no street should intersect any other street at an angle less than sixty-five (65) degrees.
2. Property lines at intersections should be set so that the distance from the edge of pavement, of the street turnout, to the property line will be at least as great as the distance from the edge of pavement to the property line along the intersecting streets. This property line can be established as a radius or as a sight triangle. Greater offsets from the edge of pavement to the property lines will be required, if necessary, to provide sight distance for the stopped vehicle on the side street.
3. Off-set intersections are to be avoided. Intersections which cannot be aligned should be separated by a minimum length of 60 meters between survey centerlines.

E. Cul-de-sacs

Cul-de-sacs shall not be more than one hundred and fifty (150) meters in length. The distance from the edge of pavement on the vehicular turn around to the right-of-way line should not be less than the distance from the edge of pavement to right-of-way line on the street approaching the turn around. Cul-de-sacs should not be used to avoid connection with an existing street or to avoid the extension of an important street.

F. Alleys

1. Alleys shall be required to serve lots used for commercial and industrial purposes except that this requirement may be waived where other definite and assured provisions are made for service access. Alleys shall not be provided in residential subdivisions unless necessitated by unusual circumstances.
2. The width of an alley shall be at least six (6) meters.
3. Deadend alleys shall be avoided where possible, but if unavoidable, shall be provided with adequate turn around facilities at the deadend as may be required by the Planning Board.

G. Permits For Connection To State Roads

An approved permit is required for connection to any existing state system road. This permit is required prior to any construction on the street or road. The application is available at the office of the District Engineer of the Division of Highways.

H. Offsets To Utility Poles

Poles for overhead utilities should be located clear of roadway shoulders, preferably a minimum of at least 9 meters from the edge of pavement. On streets with curb and gutter, utility poles shall be set back a minimum distance of 1.8 meters from the face of curb.

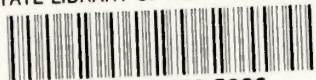
I. Wheel Chair Ramps

All street curbs being constructed or reconstructed for maintenance purposes, traffic operations, repairs, correction of utilities, or altered for any reason, shall provide wheelchair ramps for the physically handicapped at intersections where both curb and gutter and sidewalks are provided and at other major points of pedestrian flow.

J. Horizontal Width on Bridge Deck

1. The clear roadway widths for new and reconstructed bridges serving 2 lane, 2 way traffic should be as follows:
 - a. Shoulder section approach
 - i. Under 800 ADT design year

Minimum 8.4 meters width face to face of parapets, rails, or pavement width plus 3 meters, whichever is greater.



3 3091 00590 5286

ii. 800 - 2000 ADT design year

Minimum 10.2 meters width face to face of parapets, rails, or pavement width plus 3.6 meters, whichever is greater.

iii. Over 2000 ADT design year

Minimum width of 12 meters, desirable width of 13.2 meters width face to face of parapets or rails.

b. Curb and gutter approach

i. Under 800 ADT design year

Minimum 7.2 meters face to face of curbs.

ii. Over 800 ADT design year

Width of approach pavement measured face to face of curbs.

Where curb and gutter sections are used on roadway approaches, curbs on bridges shall match the curbs on approaches in height, in width of face to face of curbs, and in crown drop. The distance from face of curb to face of parapet or rail shall be a minimum of 450 millimeters, or greater if sidewalks are required.

2. The clear roadway widths for new and reconstructed bridges having 4 or more lanes serving undivided two-way traffic should be as follows:

a. Shoulder section approach - Width of approach pavement plus width of usable shoulders on the approach left and right. (Shoulder width 2.4 m minimum, 3 m desirable.)

b. Curb and gutter approach - Width of approach pavement measured face to face of curbs.

